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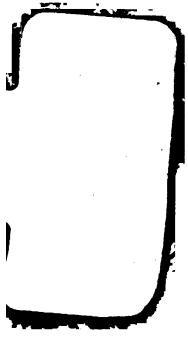

U. S. DEPARTMENT OF AGRICULTURE.

OFFICE OF EXPERIMENT STATIONS—BULLETIN NO. 169.

A. C. TRUE, Director.

REPORT

ON

AGRICULTURAL INVESTIGATIONS IN ALASKA, 1905.

BY

C. C. GEORGESON, M. S.,

Special Agent in Charge of Alaska Experiment Stations.

WASHINGTON:

GOVERNMENT PRINTING OFFICE.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF EXPERIMENT STATIONS,
Washington, D. C., April 30, 1906.

SIR: I have the honor to transmit herewith and to recommend for publication as Bulletin No. 169 of this Office a Report on Agricultural Investigations in Alaska for 1905, by C. C. Georgeson, M. S., special agent in charge of the Alaska agricultural experiment stations.

Respectfully,

A. C. TRUE,
Director.

Hon. JAMES WILSON,
Secretary of Agriculture.

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REPORT ON AGRICULTURAL INVESTIGATIONS IN ALASKA, 1905.

WEATHER CONDITIONS.

In Alaska the weather is the controlling factor which determines the degree of success attainable in agriculture. During the season of 1905 the weather was favorable to agricultural operations in the coast region. The months of July and August were bright and warm, and the gardens throughout that region were quite successful. In the interior, on the other hand, conditions were somewhat less favorable. The spring was late, raw, and overcast. Seeding was therefore late and early growth was slow. In July and early August the weather was favorable, but during the middle and latter part of August the weather was rainy and overcast, which retarded the ripening of the crops. Conditions were not uniform throughout the interior. In the Yukon and Tanana valleys the settlers complained of too much rain and not enough sunshine. In the Copper River Valley there was not enough rain, and killing frosts began in the latter region as early as August 14. Light frosts occurred in the Yukon Valley on several days the latter part of August, but no killing frosts destructive to hardy plants occurred until September. Hence the grain crops matured at the Rampart Station, although they were late, while only a small percentage matured in the Copper River Valley because of an early killing frost.

SUMMARY OF THE SEASON'S WORK.

SITKA STATION.

It was explained in last year's report that the work of the Sitka Station would in the future be devoted chiefly to horticulture. In conformity to this plan two lines of work were undertaken which it seemed most important to prosecute: (1) The introduction, propagation, and testing of fruit trees and fruit bushes, with a view to ascertaining what sorts, if any, can be successfully cultivated in Alaska; and (2) the testing of varieties of vegetables best suited to the climate and the soil in various parts of the Territory.

As to the introduction and propagation of nursery stock work begun last year was continued. Among fruit trees attention has been chiefly directed to the apple as the one most likely to succeed in far northern latitudes. Only summer varieties have been selected, and these again of only the hardiest sorts. It is almost certain that the season in any part of Alaska is too short to mature fall and winter varieties, but summer apples which, in more southern latitudes, mature in July or early in August may possibly have time to develop before the cold weather sets in. As stocks, seedling apples of hardy varieties have been chosen. Several thousand of these seedlings have been grafted at the station, and some have been purchased already grafted. A few trees of each of the promising varieties have been planted at the station with a view to noting their behavior, but the majority have been or will be sent out to all parts of the Territory to be tested. It will take some years before results can be secured from which it is safe to draw conclusions. Success in fruit growing is problematic at best. At Wrangel are two trees known to the writer which have matured apples. There is a native crab apple in southeastern Alaska (*Pyrus rivularis*), but it is little more than a bush, though specimens have been found with trunks 5 or 6 inches in diameter. It is of slow growth, and on that account it is doubtful if it would have any value as a stock on which to graft. The apples are about the size of sour cherries, but they are much valued for jelly. When the weather is cold and rainy during the flowering period, the last of May, these native crab apples fail to set fruit. This would point to failure also of better varieties under similar conditions. Among the varieties considered for introduction, we have selected several of the crab apples and their hybrids as being on the whole the most promising sorts.

The nursery stock at the station has not grown as vigorously as it would in a better soil and warmer climate. This is in part due to the soil, which has not as yet been brought into satisfactory condition. Our efforts to improve it will be briefly mentioned later. A year ago there were slight signs of fungus diseases appearing on the nursery stock. The past season this evil increased so that we found it necessary to spray with Bordeaux mixture several times. These sprayings kept the attacks in check, but they nevertheless had a retarding effect on the growth. This nursery work will be continued and extended.

While there may be some doubt of the success of fruit trees, there is no doubt whatever concerning the success of fruit bushes in almost all parts of Alaska south of the Arctic Circle. Raspberries and currants grow wild, and cultivated varieties of these bush fruits are grown with marked success everywhere they have so far been tried. In the coast region raspberries, currants, and gooseberries grow better

and yield more fruit than they do in regions east of the Rocky Mountains. It is planned to test as many varieties of these as can be obtained at slight cost, in order to determine what sorts do best.

Strawberries have been only a partial success at the Sitka Station. The cultivated varieties so far introduced have been winterkilled, not, indeed, as the result of cold weather, but by repeated freezings and thawings, which caused the plants to be heaved out of the soil, even when protected by a covering of spruce boughs. In some places strawberry culture is quite successful, as, for instance, at points on Prince of Wales Island, at Killisnoo, and in some gardens at Skagway. The native Alaskan strawberry has been brought under cultivation, and though it grows well it is found to produce very little fruit. Efforts will be made to produce hybrids between this native berry and some of the cultivated varieties. In this connection I will mention that we succeeded last year in cross-fertilizing the cultivated raspberry with the salmon berry (*Rubus spectabilis*), which grows wild throughout the coast region. The two plants do not bloom at the same time, the salmon berry being out of bloom before the raspberry begins. To overcome this we planted raspberry bushes in boxes and kept them in the greenhouse, and the periods of blooming of the two were thus adjusted to correspond to each other.

In the line of vegetable growing efforts were directed chiefly to potatoes, cabbage, and cauliflower, though small beds of all the hardy vegetables were grown. The work will be continued. The soil on which these tests were made is new and raw, the best soil having been given over to the nursery work. A piece of new ground in front of the cottage has been grubbed and drained. This has, however, only proceeded when time could be spared from the cultivated ground. It is not completed and will be continued as time and means may permit.

BURNING LIME.

For the purpose of procuring lime to apply to the land at less cost than it can be purchased in the local markets, we have tried the experiment of quarrying limestone from a ledge of that material located some 14 miles from Sitka. The launch and scow belonging to the station were used for hauling the rock home, where it was burned. It was impracticable to burn it at the quarry because the frequent rains would slack the burned lime, and it was out of the question to build a rain-proof shelter. The experiment was a success so far as it went. Good, active quicklime was made, and the fuel used consisted mostly of roots and stumps from the clearings. The labor involved is considerable, however, and in the absence of a lime-kiln, which it would not pay to build, only a little over half of the rock was burned sufficiently each time. Two methods of piling the

fuel and rock were tried. In one case a foundation of logs 12 feet long was laid on the ground; on this another layer of logs was laid crosswise, and on top of this 2 or 3 feet of roots and stumps. A layer of lime rock, broken in sizes of 6 or 7 inches in diameter, was piled on top 1 foot thick. Then the pile was built up with alternate layers of fuel and lime rock until it was 12 feet high. Slabs (the outer cuts from logs), obtained from a local sawmill, were nailed outside the whole pile and the chinks between these closed with sod to exclude the inrush of cold air so far as possible. The top of the pile was also covered with sod, and to secure a good draft a flue was built in the center by placing old barrels, with the bottoms knocked out, on top of each other as the pile was built up. When all was ready a can of lowest grade kerosene obtainable was poured over the whole and the fire started. The result was a success, as stated, to the extent of burning rather more than 50 per cent of the limestone.

In the other case a pit 12 feet in diameter was dug 6 feet deep, and the fuel and rock were piled in alternate layers as before. Here the slabs were not needed. The earth excluded the air more effectively than the slabs did. The results were practically the same. Settlers who have convenient access to a ledge of limestone can burn lime in this way. More would be burned at the station but for two circumstances. One is that the launch is disabled, so that the limestone can not be hauled, and the other is a fall in the price of lime on Puget Sound, by which it can be laid down at the station at $1.67 per barrel of 200 pounds, all charges paid. At this rate there will be little if anything saved by burning the lime, when all the items of quarrying, hauling, and cutting and transporting the fuel, etc., are counted.

COOPERATION WITH SETTLERS.

As in former years, the station has enlisted the cooperation of the settlers throughout the Territory in the testing of varieties of vegetables, by the distribution of seeds for their use. Seeds are sent to those who desire them with the understanding that at the end of the season they are to write a detailed report of the results obtained. Very many of them neglect this duty; others, however, do write interesting and valuable reports, some of which are published under the head of "Reports from the seed distribution." The object is twofold—first, to ascertain as far as possible what varieties of vegetables are best suited to certain regions, and, second, to ameliorate the conditions of life among the settlers and prospectors by helping them to raise gardens.

In this connection we desire to give grateful acknowledgment to the chief of the Bureau of Plant Industry, Dr. B. T. Galloway, and to Mr. A. J. Pieters, in charge of seed and plant introduction and distribution, who have furnished the seed for this purpose.

As noted, we have extended this cooperation by the distribution of selected fruit trees and fruit bushes. Only a limited number of trees were available last year, so only a few were sent to each person, and we were unable to fill all the applications received; but it is planned to continue and extend this work. It is of vital importance to ascertain which varieties, if any, of the tree fruits can be successfully grown in Alaska, and it is likewise important to stock the Territory with fruit trees, if any are found which will mature fruit. The apple is at once the most important and the most likely fruit to mature. This is therefore given chief attention. The varieties under experiment are enumerated in the notes (page 27).

METEOROLOGICAL WORK.

The cooperation with the United States Weather Bureau in collecting meteorological data has been continued during the past year. The Weather Bureau supplies the instruments required for voluntary observer's stations. They consist of a maximum and a minimum thermometer and a rain gauge. The special agent establishes the stations wherever it is thought desirable one should be located, provided a reliable permanent resident can be found to undertake the work, which is wholly without compensation. Monthly reports from all these stations are sent to the special agent at Sitka, who conducts the correspondence and issues supplies as needed. It is a most important work and should be continued for a long period of years, but it involves considerable office work.

COPPER CENTER STATION.

The work of this station is devoted chiefly to grain growing. About 40 acres in all have been cleared, and the past season this area was divided into about 200 plats and cropped mainly to grain, but also to grasses and vegetables. Only a small percentage of the grain matured this year. Early frost is the bugbear of this station. This is the third year since work was begun here. In 1903 the first frost occurred August 27. At that date nearly all the grain had matured, so the outlook was quite encouraging. In 1904 the first killing frost occurred August 17. At that time only the earliest varieties had matured. But this year a severe killing frost occurred August 14, before any but the very earliest sowings of the earliest varieties had matured. Owing to the fact that we have but one team and only one man employed the period of seeding necessarily extends over some three weeks, the past year from May 9 until the close of the month. Now, it is found that the varieties sown before May 15 have matured, at least in part, whereas those sown later than that date were totally killed by frost and had to be cut for hay. In no case did a variety

mature as completely as could be desired. The following varieties matured in part: Kharkov winter wheat and Ladoga spring wheat; Excelsior winter rye; Champion, Lapland, and Manshury barleys, and, to a less extent, Chevalier, Odessa, Black Hulless, Hanna, and Primus barleys. The following varieties of oats matured in part: Finnish Black, Banner, Russian No. 2800, Tartar King, Sixty-Day, the Improved Ligowo, and Burt Extra Early.

Attempts are being made to develop varieties which will mature by the middle of August, and there is scarcely any doubt but that we shall succeed in this. The earliest maturing heads will be selected and saved for seed, and this selection will be continued year by year until the result sought is obtained.

It is a rather remarkable fact that killing frost did not occur at the Rampart Station in the Yukon Valley, 3½ degrees farther north than the Copper Center Station, until September. While there were six light frosts at Rampart in the latter part of August none of these injured the grain seriously, and the crops therefore matured. For some reason, as yet unexplained, the Copper River Valley appears to have killing frosts earlier than the Yukon Valley.

Rapid-growing vegetables did fairly well. Peas were especially successful, and the varieties known as "Alaska" and "Prolific Early Market" matured seed before the killing frost of August 14. Turnips and ruta-bagas succeeded nearly everywhere. The Broad Windsor bean, it is worthy of notice, produced edible pods, but it failed to mature seed before the frost. All the clovers were winter-killed. There is therefore but little hope that the perennial clovers can be grown as ingredients of the pastures.

In the interior grain hay will always be an important crop. In this connection attention is called to the fact that rye gave a better yield than oats or other grain.

IRRIGATION MAY BE NECESSARY.

One point which has developed since work began in the Copper River Valley is that the rainfall there is very light, and it is feared it will be insufficient for the normal development of grain crops, at least in some seasons. The rainfall from October 1, 1904, to September 13, 1905, at the Copper Center Experiment Station, was but 9.8 inches. Of this only 3.05 inches fell during the months of May, June, July, and August. The remainder represents mostly snow, which fell during the winter. This looks as though irrigation would be necessary to insure normal development of crops. Owing to the drought in the early part of the summer, much of the grain was too short to cut.

FERTILIZERS IMPROVE THE YIELD.

It is further to be noted that the soil is not naturally rich. Where fertilizers were applied there was an increase in the yield of straw, which, in some cases, amounted to double the weight obtained on unfertilized plats. Alaska soils are, as a rule, not fertile, except on alluvial deposits near the mouths of the rivers or elsewhere where silt has accumulated. There is but a small amount of vegetable mold in the soil. In the coast region, where the rainfall is abundant, vegetation is luxuriant nearly everywhere, but in the interior, where the rainfall is scant, the native vegetation is not abundant. Consequently, but little humus is accumulated. Owing in part, also, to the same cause, disintegration of the rocky material is not so complete as it is in more southern latitudes; that is, the soil, as a rule, contains a large percentage of gravel. These conditions combine to make the addition of fertilizers very desirable. The fertilizer used the past season was fish guano, an Alaskan product manufactured at Killisnoo.

FALL PLOWING ESSENTIAL.

An important point to note in regard to grain growing in the interior is that the land should be fall plowed. This will save labor in the spring, when it will be only necessary to go over the field with a disc harrow in order to put it in condition for seeding. All who attempt to farm in the interior should, therefore, make an effort to plow the land thoroughly immediately after the crops are gathered in the latter part of August or the beginning of September.

EARLY SEEDING NECESSARY.

Another important point is to get the seed in the ground as early as possible. Begin seeding in early May whenever it is possible to work the ground, and let nothing interfere with the work until all the seed is planted. Early seedings may be caught by frost, but late seedings are sure to be.

RAMPART STATION.

While the Rampart Station was reserved in 1900 and a small clearing of about half an acre made, no one was regularly employed at this station until July, 1904, when Mr. Fred. E. Rader, formerly assistant at Sitka, was made superintendent of the station. He went to work at once and cleared about 2½ acres of land in that year, 2 acres of which were seeded for the first time in the present season. During the summer of 1905 the clearing was continued, and he has now about 5½ acres ready for the plow. The cleared portion was seeded to grain and planted to vegetables. It has already been noted that most

of the grain matured, although the seeding was late, the first grain being sown May 18. The summer was not altogether favorable. It was colder than usual, with more cloudy and rainy weather than is normal in that region, and the early growth was slow. Mr. Rader's report (see p. 55) shows that nearly everything matured. Winter rye ripened satisfactorily, but winter wheat, on the other hand, did not fully ripen. These fall-sown grains were partly winter-killed from the fact that the snowfall was very light, and as the snow was the only protection the grain was killed where the snow was thinnest. The writer visited this station in the middle of July and again on August 10. On these dates the prospects were not favorable for the harvest; but seasonable weather continued throughout the month of August, and as the frosts which occurred in the latter part of that month were not severe enough to injure the grain the crops ripened.

Ten thousand feet of lumber were purchased to be used in the building of a house at this station, which is planned to be put up during the summer of 1906. The logs for this lumber were purchased from the contractor who had supplied Fort Gibbon with logs for buildings, and they were sawed and transported through the courtesy of officers of the War Department.

Rabbits are so numerous about Rampart as to be a veritable pest. Both grain and garden crops have to be fenced rabbit proof. In the absence of such protection, everything is eaten to the ground. Part of the cleared ground has been fenced by driving barrel staves in the ground and part will be fenced with wire netting.

KENAI STATION.

The writer visited Kenai Station in early September. There are 25 acres under cultivation at this place, all of which was seeded to grain. Only once since the first crop was harvested, in 1899, has grain matured at this station. The summers are too cool and cloudy and, though the rainfall is not excessive, there is a lack of the sunshine which is so necessary for the grain. Last season's crop was intended only for feed and consisted chiefly of oats, though some barley was also grown. These grains made a good growth, and by the beginning of September the grain was in the milk, and thus afforded most excellent feed. The fall was so dry that all the grain was cured for hay.

Pursuant to the plan announced in last year's report, this station will in the future be devoted chiefly to dairying. A small herd of native cattle has been reared at the station, the cows being purchased in the village three and four years ago. There were four cows in milk last summer, which, with the heifers, calves, and yoke of oxen, made a total of thirteen head. From this number the superintendent

sold a cow and a calf, leaving eleven to be wintered. Part of the milk has been sold and part made into butter, which found a ready sale at from 35 to 40 cents a pound. A dairy equipment suited for about twelve cows has been purchased and sent to this station, and the manufacture of butter and cheese will hereafter be the main feature of the work there, aside from the growing of feed and experiments with forage plants.

RESERVATION AT FAIRBANKS.

The people of Fairbanks petitioned the Secretary of Agriculture last winter for the establishment of an agricultural experiment station at some suitable point in the Tanana River Valley. As a result, the special agent in charge was instructed to examine the Tanana Valley and, if a suitable location was found, to make a reservation for possible future use as an experiment station. Pursuant to these instructions the writer left Sitka on July 9 and went down the Yukon by way of Skagway and Whitehorse, arriving at the Rampart Experiment Station on the evening of July 17. Two days were spent at this station. Superintendent Rader, with one hired man, was hard at work clearing land. The crops on the cultivated ground looked well, but they appeared to be rather late. This was due to cold, wet weather in the spring and early summer. Plans were perfected for the building of a small house for the use of the station, and Mr. Rader and the writer left Rampart July 19 and arrived at Baker, 80 miles from Tanana, July 23. After examining the region about the Baker Creek Hot Springs (concerning which a statement will be made elsewhere in this report), they returned to the river and arrived at Fairbanks July 28. Three days were spent in exploring the country in various directions from Fairbanks, with a view to finding a suitable location for the purpose of an experiment station. The best situation was found to be a tract of land which lies nearly midway between Fairbanks and Chena, and which adjoins the Tanana Mines Railway, now completed between these two towns, with a main line running to the mines. Accordingly, a survey was made of this tract, field notes and map of which are submitted herewith. On the return trip the station at Rampart was again visited while the boat remained in port, and it was noted that the crops had made good progress during the preceding three weeks.

Referring to the map submitted herewith (fig. 1) it will be seen the tract selected lies in the angle formed by the Fairbanks branch of the Tanana Mines Railway and the main line of this road, which forms a junction with the line from Chena to Fairbanks, nearly midway between the two towns, and runs out to the gold diggings

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some 20 miles distant. The tract comprises 1,393.97 acres. It is in many respects ideal. A low ridge of hills runs almost parallel to the railway, beginning near the southeast corner of the reservation and extending in a westerly direction three-fourths of the distance across the tract. This ridge is covered with fine timber, consisting

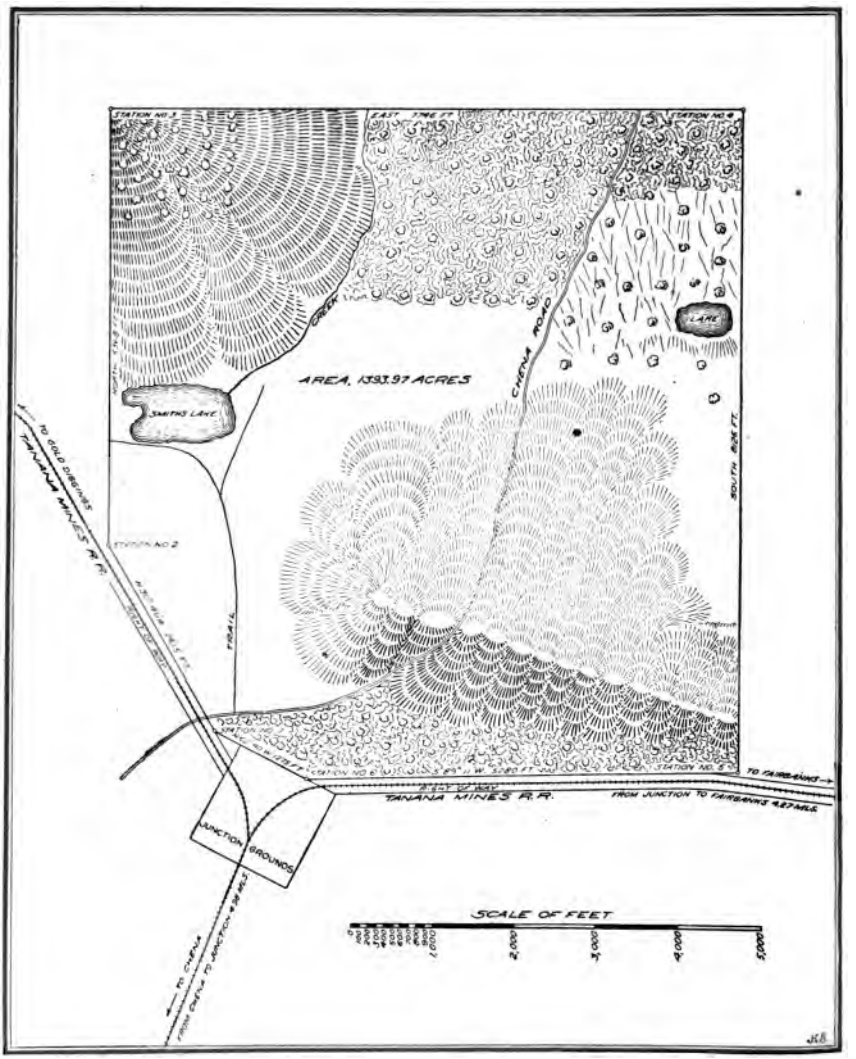

FIG. 1.—Map of proposed United States reservation for experiment station purposes between Fairbanks and Chena, Alaska.

of almost equal proportions of spruce and birch. When cleared it will afford a fine southern slope for culture. The northward slope of this ridge is more gradual than that on the south side. It is timbered in the same way, though the timber is smaller. In the northwest corner of the tract is another elevation, which affords slopes

FIG. 1.—VIEW OF TANANA VALLEY FROM HOT SPRINGS FARM.

FIG. 2.—NENANA, INDIAN VILLAGE ON THE TANANA.

to the south, southeast, and east, of excellent soil, timbered chiefly with spruce and birch. Through the center of the tract from east to west the ground is somewhat low, and there are two lakes, one named Smiths Lake, about 25 acres in extent, and the other, which is unnamed, about 5 acres in extent. Immediately surrounding these lakes is some low, swampy ground, but the waste ground of this nature, and including the lakes, will not exceed 100 acres, all told. The rest of the tract is comparatively level. It has been covered with small timber, but this timber has been destroyed by a fire, which apparently occurred some years ago, and only the dead, charred trunks now remain to tell of the former forest. More than half of these dead trunks have been overturned by the wind and lie scattered in all directions. This timber is small, from 5 to 8 inches in diameter in most cases, though there are some larger trunks. The ground is covered with a scattered growth of low bushes, very prominent among which is the black huckleberry. There are also scattered patches of grass, but there is no general or dense luxuriant growth of grass, unless the sedges on the swampy land and around the lakes be so considered. The writer saw moose tracks in several places, but squirrels were the only wild animals encountered in the woods. A road, which leads from Chena to the mines, runs through the tract, as indicated on the map, and there is also another trail running from near station No. 1, on the southwestern corner, to Smiths Lake and beyond. The shaded hillsides are covered with green timber, the rest of the tract with dead timber and bushes, as stated. The writer considers it an admirable tract of land for an experiment station, and being located on the railway, there will not be the trouble in the transportation of supplies and equipment that was experienced at the Copper Center Station. The top soil everywhere consists of a thin layer of muck, which grows thicker, reaching a foot or more in depth on the lower ground. Below this is a yellow, rather sandy loam. Portions of the tract can be cleared and broken at slight expense.

The Tanana Valley is undoubtedly well adapted to agriculture as we now understand the term in connection with Alaska (Pl. I, fig. 1). The valley is wholly distinct from that of the Yukon, being separated from it by high mountains. According to the reports of settlers and prospectors who have lived in this valley for longer or shorter periods, the climate is milder here than in the Yukon or in the Copper River valleys, and all agree that the spring is at least three weeks earlier in the Tanana Valley than it is in the Yukon Valley. Eighty-two homesteads have been taken up and recorded in the Fairbanks recording district. The proximity of the mines and the wide extent and apparently rich gold deposits make it certain that there will be a large population in this valley for many years to come, and as this population will need grain, forage, and vegetables for its support and

for work animals, it appears to be highly desirable that an experiment station should be started at this point. I recommend that this reservation be set aside as an agricultural experiment station, and that work be begun, even though it be on a small scale, during the year 1906, if possible.

THE TANANA VALLEY.

The Tanana River is a stream of majestic proportions. It takes its rise in the high mountains in about latitude 62° N., near the Canadian boundary, and runs in a northwesterly direction until it joins the Yukon in latitude 65°. Including the bends and turns in the river, it is about 600 miles in length, though that portion of the valley adapted to agriculture is but about 400 miles long. The river carries a large volume of water, and in places it spreads over a large area. It is navigable to river boats of good size from its mouth to Fairbanks, a distance of 267 miles. For a distance of some 60 miles upstream from Fairbanks the river is divided into a number of shallow channels through which the water flows with great rapidity. In this portion it is navigable only by small and very powerful boats, strong enough to stem a 12-mile current; but beyond this area it is navigable again for more than 200 miles.

The valley inclosing this river has an average width of about 25 miles and consists in the main of a rolling country, densely wooded with spruce, cottonwood, and birch. At a rough estimate the valley contains 15,000 square miles, most of which can be utilized for agricultural or grazing purposes.

The principal settlement is at Fairbanks, 267 miles from the Yukon. The town itself has a population of perhaps 3,000 people, but it is estimated that there are some 10,000 or 12,000 people in that region scattered among the creeks and in the mining camps which have sprung up on the various creeks. Chena, some 12 miles farther down the stream, is a prosperous little town with a fine townsite. There are a few white settlers at Nenana (Pl. I, fig. 2), Kantishna, Tolovana, Baker Creek, and at the famous Hot Springs. At the mouth of the Tanana is Fort Gibbon, where some 200 soldiers are stationed, and a town is springing up in the neighborhood. Above Fairbanks are a few small mining camps, the principal one being at Delta.

HOT SPRINGS, TANANA VALLEY.

Some 80 miles from the mouth of the Tanana, a so-called slough, i. e., the stagnant water in an old closed channel, joins the Tanana. Following this slough for a distance of 6 miles one reaches the famous hot springs of the Tanana. The agricultural conditions here are so unique that, although they were mentioned in last year's report, the

writer ventures to return to the subject more particularly, because an opportunity was offered to study the characteristics of the location during the summer of 1905. There are several small hot springs bubbling out of the ground near the head of the slough. The country is strongly rolling, forming a series of knolls and hills, and between and at the bases of these are a number of seepages of hot water. A prospector named J. F. Karshner, who was formerly a farmer in Kansas, happened on these springs, and, correctly estimating their importance, located a homestead, including the springs. He began clearing land, and the following year, that of 1903, he planted his first garden. He met with such remarkable success that he has extended the clearing and continued his gardening operations.

The unique feature of the situation is that the ground over an area of some 25 or 30 acres appears to be warmed, either by the presence of the springs, or, perhaps, from the underlying hot rocks which heat the water. This ground thus forms a natural hotbed. Ordinary garden crops develop with great rapidity. When visited July 24 he had already marketed his early cabbage, cauliflower, carrots, and peas, to say nothing of radishes, lettuce, turnips, and other crops of rapid growth. His new potatoes were fully grown and of excellent quality, and the ground from which the early cabbage and cauliflower had been removed was already planted to the second crop of cabbage. For a hotbed a tent was stretched over a suitable patch of soil and seed sown under it. The natural warmth in the ground, which is not, however, so great as to be readily perceptible to the hand, was sufficient to grow the plants in the month of April to such size that they could be planted in May. The possibilities of the place are very great. Mr. Karshner grows beans, cucumbers, squash, Lima beans, and last year there were likely looking plants of both muskmelons and watermelons growing on the hillside. It is a patch of the Temperate Zone put down near the center of Alaska.

The illustrations submitted herewith show the nature of the vegetables (Pl. II). The timber on this land is mostly poplar. Men were at work clearing when the writer was there. The accompanying statement from Mr. Karshner gives further details of his operations. He finds a market for all he can produce at Fairbanks.

Farming in Alaska will prove all right in the future when once it is understood what kinds of grains, grasses, and vegetables will do well, and we learn how to grow them. Agricultural products grown here must be managed differently from what they are in the States to make it profitable. It is especially necessary to learn what kinds are adapted to this country.

As to potatoes, seed brought from the States does not yield as good a crop as the seed raised here. I have taken note of that for the last two years, and I suppose it will hold good with all kinds of vegetables and grains. Only time and experiments can determine this with certainty. I shall try to raise more seed of my own. I must cite you another case in point, and that is peas. I

sowed peas of the earliest I had last year and planted them side by side with the same kind I had sent me by a seedsman in Wisconsin with the result that my home-grown seed produced peas fit for use at least five days earlier than the other. So also with potatoes; I got larger and earlier ones from my own seed.

Now, as to the financial side: I suppose you wish to know the prices my crops brought, and I quote as follows: Cauliflower, 40 cents per pound; cabbage, 25 cents per pound; celery, 50 cents per bunch. These held good for the season's crop, but the others fluctuated. Potatoes, 22 cents per pound, and at the end of the season 9 cents per pound; beets, 30 to 10 cents per pound; parsnips, 20 to 18 cents per pound; peas, 25 to 20 cents per pound; turnips, 20 to 8 cents per pound; ruta-bagas, 15 to 10 cents per pound. As to squash, tomatoes, and cucumbers, the cucumbers did fairly well, but I can improve the crop by a different method of planting and caring for them. The squash did not do as well as the first year's crop because the season was unfavorable, the latter part especially being too wet and cold. I had a few squashes. Corn commenced to fill out, but did not mature for the same cause. The tomatoes grew too strong in branches. I had quite a number of small green tomatoes. They did nothing but blossom until I trimmed the tops, then fruit commenced to form. People took them for potato tops. I will prune severely in future. I am satisfied I can raise them here.

WORK WITH LIVE STOCK.

It is recommended that the small appropriation which Congress has allowed for experiments with live stock be used to purchase cattle and sheep adapted to the climate of Alaska. The Galloway and the West Highland cattle are the hardiest breeds in this country. As many head of one of these, or of both of them, as can be purchased and transported to Alaska with the available funds should be procured. What is needed is a general-purpose animal—one which makes good beef and which can at the same time be used for the dairy. The Galloways are the most numerously represented, and can be purchased for less than the West Highlanders. It is therefore proposed to select Galloway cows with good milking qualities—for, although they are essentially beef cattle, there are some good milking families among them—and, with these cows as a foundation, develop a hardy, all-purpose strain, suited to Alaska conditions.

If the appropriation will permit, it will also be highly desirable to purchase a few head of West Highland cattle. This is a purely beef breed, suited to the rigorous climate and noted for their rustling qualities. Cattle of that class will be of the highest value to Alaska in time to come.

The introduction of hardy sheep is almost equally important, and a portion of the appropriation should be used for this purpose. The Blackfaced Scotch breed, and the Danish breed, which has for long periods of years been bred in Iceland, should be purchased if they can be procured in this country. These are among the hardiest sheep, and it is safe to say that they will do better in Alaska than any so far tried here.

FIG. 1.—VEGETABLES, HOT SPRINGS FARM ON THE TANANA.

FIG. 2.—VEGETABLES, HOT SPRINGS FARM ON THE TANANA.

It is proposed, if the necessary money is appropriated for this purpose, to select from twenty-five to fifty head of sheep, either of the Blackfaced Scotch breed or Iceland sheep, or both. When animals of this character are introduced they should be bred primarily with a view to develop those qualities which are of first importance to meet Alaska conditions, namely, hardiness and usefulness for general domestic purposes. In the view of the writer, the offspring in excess of that required for the experiment stations should be sold to settlers in Alaska for breeding purposes. They would thus aid in stocking the Territory with cattle which the ordinary pioneer could not afford to introduce. Congress has appropriated something over $200,000 for the introduction of reindeer in Alaska, a measure which in itself is very commendable and highly beneficial to the Territory, but may it not be assumed that cattle and sheep would be of equal value?

It would be greatly to the advantage of the Territory if an appropriation of $10,000 were made for the establishment of a live-stock station on Kodiak Island, such station to be stocked with cattle and sheep of the above-named breeds. Kodiak is mentioned as the most desirable place for such a station because it affords abundant pasturage, and a breeding station could be maintained there at less cost than elsewhere in the Territory. Some buildings would be needed, but this item would not be costly. Hardy stock could run out nearly the year round, and one competent man would be all the labor needed. Kodiak is, moreover, accessible at all times. Boats touch here regularly, and stock could be shipped to all ports on the coast and from there to interior points with equal ease. If there were sufficient natural pasturage at Sitka, this point would be chosen in preference, because the headquarters for the station work are located there; but the natural pasturage is lacking. Neither can the Kenai Station be chosen, for the reasons set forth below.

SITUATION AT KENAI.

The economic conditions on the Kenai Peninsula, particularly as regards transportation, are undergoing an important change. The Alaska Central Railway is building from the new town of Seward, at the head of Resurrection Bay, and will run across the neck of the peninsula to the towns of Hope and Sunrise, and on northward around the head of Knik Arm and through the valley of the Sushitna to the gold fields on the Tanana (Pl. III). This railroad will doubtless carry the traffic destined for the interior and for the northern part of the peninsula, and when completed as far as Sunrise, which will be during the next few months, the traffic on Cook Inlet, which has been chiefly maintained on account of the settlers at Turn-Again Arm, will undoubtedly cease, either in part or altogether. This will

leave the Kenai Station inaccessible except by hiring special conveyance. It is therefore recommended that steps be taken to remove this station to a suitable location somewhere on the railway, the place to be selected after the road is built and in operation.

This change in transportation could not possibly have been foreseen at the time the station was located at Kenai, in 1898. It was then expected that the peninsula would be settled by people who would work in the newly discovered placer mines and in the coal fields, which were then being opened up in the peninsula; but neither the coal fields nor the placer mines have made any progress.

HOMESTEADS.

The writer has taken pains to ascertain how many homesteads have been recorded to date in Alaska. Reports have not been obtained from all recording offices, but those heard from are as follows:

Circle	5
Fairbanks	82
Copper Center	11
Skagway	33
Juneau	36
Sitka	6
Yakutat	6
Catalla	3
Valdez	39
Seward	59
Total	280

It is probable, however, that many of these homesteads have been taken up for the value of their timber rather than for the purpose of utilizing the land for agriculture.

GRASS INVESTIGATIONS.

It is hoped that the very valuable work which was begun by Professor Piper in the summer of 1904, by his investigations of the grass lands along the coast region of Alaska, can be continued. The native grasses and forage plants of the interior have never been investigated by a specialist. The force employed by the Alaska stations can not be spared from their regular duties for this work. It is therefore respectfully recommended that steps be taken to continue cooperation with the Bureau of Plant Industry in this work. If that Bureau could send a man to do the work, Alaska stations might possibly undertake to defray half of his expenses while so engaged in Alaska, the resulting information to be at the disposal of the Bureau of Plant Industry and the Alaska stations.

FIG. 1.—VIEW ON ALASKA CENTRAL RAILWAY.

FIG. 2.—TOWN OF SEWARD, RESURRECTION BAY, TERMINUS OF ALASKA CENTRAL RAILWAY.

IMPORTS OF FARM PRODUCTS.

During the fiscal year ending June 30, 1904, farm products were imported into Alaska to the value of $3,340,899. This total includes many things grown in tropical regions, as coffee, rice, sugar, tobacco, nuts, etc., and it also includes whiskey, wines, beer, etc., which are manufactured from farm products, but deducting all of these, the following interesting figures show the imports into Alaska for the year named:

Imports into Alaska during the year ended June 30, 1904.

Animal products:		
Live animals	$190,900	
Dairy products	454,736	
Eggs	164,471	
Beef, fresh, cured, and canned	272,536	
Pork	241,111	
Other meat products	84,962	
Miscellaneous animal products	118,806	
Total animal products		$1,527,522
Vegetable products:		
Vegetables, fresh, dried, and canned	333,550	
Grain and grain products	392,922	
Fruits	231,062	
Hay	120,084	
Total vegetable products		1,077,628
Total animal and vegetable products		2,605,150

This will give an idea of the market that Alaska affords for these products, a very large percentage of which could be produced in the Territory.

FORESTS IN THE INTERIOR.

The writer desires to call special attention to the forests in the interior. They are of such importance that they should, in his opinion, be accorded Government protection for the benefit of coming generations. The chief forest belt of the Territory lies in southeastern Alaska, and the most valuable portion of this belt has already been set aside as a forest reserve. This is highly commendable; but it is even more necessary to preserve the smaller timber of the interior. The forests make life possible there. Without them the white race would have to live as do the Esquimo. To import the timber needed for fuel, for mining, for buildings, and for structural purposes of all kinds would be well-nigh impossible, and the prices would be prohibitive. At interior settlements, right in the midst of the forests, lumber is worth $100 per thousand board feet, and at the mines, as, for instance, on Cleary Creek, less than 20 miles from the

sawmills at Fairbanks, the writer was informed that it was regularly sold at $225 per thousand feet. What it would be worth if it had to be imported can scarcely be imagined. While the forests appear to the pioneer of the present to be an impediment to progress, their value will be increasingly appreciated as the country settles and years pass. It is the forests of the interior that have the greater value and should receive the most fostering care. Enormous areas of timber in that region are annually destroyed by forest fires, to say nothing of that consumed for steamer fuel and other legitimate purposes. Coming generations will sorely miss this timber. It can not be replaced. Growth is slow in those latitudes. If the indiscriminate destruction is not stopped, or at least regulated, and existing forests jealously guarded, development must suffer and be retarded, if not made impossible. In the timber belt of the coast region there is but little danger from forest fires. The rains are an efficient preventive. And the forest-clad gorges and mountain sides in that region are, as a rule, so inaccessible that the timber does not readily fall a prey to the woodman's ax. Nature herself protects the forests there. In the interior they are open to every sort of destruction and their loss will be grievously felt.

The spruce (*Picea alba*) is the dominating tree. It covers practically all the best land; only the swamps and steeper hillsides and the tops of the hills are void of it. Intermixed with the spruce is a liberal sprinkling of birch and cottonwood, especially on the higher ground. The timber is not large. In the Tanana Valley spruce ranges in size all the way from mere saplings to trees which measure 18 to 20 inches in diameter. Logs from 12 to 15 inches in diameter are abundant. On the basis of $100 per thousand feet, the stumpage in the Tanana Valley is worth all the Government paid for the whole Territory. It is an invaluable asset. The building of towns and the operations of placer mining would be well-nigh impossible in the absence of timber. It is being utilized. At Fairbanks the writer found three sawmills in constant operation, sawing an average of 30,000 feet of lumber a day. The question arises if it would not be wise for the Government to make forest reservations in the interior also, with a view to preserving a portion, at least, of this timber for the use of future generations. After a somewhat careful study of the situation, the writer ventures the opinion that what is needed is supervision to avoid waste, rather than withdrawal from use. The waste is not so much from destructive lumbering as it is from ravages by fire. Fires are of frequent occurrence, and with the influx of prospectors and settlers their frequency will increase unless the Government takes active measures to prevent them. Lumber is indispensable to the development of the country, and, if reservations

were made, free use of the timber by miners and settlers should not be prohibited. Rather the whole forest area should be treated as a trust fund, administered for the benefit of the people who live in the country. Regulations could be formulated for the use of timber and for the prevention of fires, and supervisors should be on the ground to enforce them; but care should be taken that they in no wise work a hardship on the people or deter the development of mining and agriculture. Fines for violations should go toward the cost of administration, and, if necessary, a very small stumpage fee might be charged for the same purpose. The use of the timber should be limited strictly to the needs of the people who live there and develop the country. No pulp mills or other manufacturing plants, which would consume timber for purposes alien to the needs of the dwellers on the soil, should be permitted.

The writer believes that a policy applicable only to the interior, along the lines here roughly indicated, would be of great benefit to Alaska.

ANALYSES OF SOIL FROM SITKA STATION.

The following report by Dr. Milton Whitney, Chief of the Bureau of Soils, on analyses of samples of soils sent him from the Sitka Station, are submitted because they throw light on the quality of much of the soil in the coast region:

No. 1. Sample of subsoil which is frequently thrown to the surface, and, in places where knolls have been leveled, now constitutes the surface soil.

	Per cent.
Nitrogen	0.05
Acid digestion:	
C_aO	Trace.
P_2O_5	Trace.
K_2O	.07

No. 2. Sample of subsoil found somewhat deeper than No. 1.

	Per cent.
Nitrogen	0.08
Acid digestion:	
C_aO	.47
P_2O_5	.12
K_2O	.67

No. 3. Peaty subsoil found in hollows and spots. Sterile to agricultural plants.

	Per cent.
Organic and volatile matter	93.8
Nitrogen	.46
Acid digestion:	
C_aO	.46
P_2O_5	Trace.
K_2O	.17

No. 4. Surface sample on peaty land which had been cleared and put in cultivation. The sample sent has been on the surface of the ground for one year. It is sterile until lime is added.

	Per cent.
Organic and volatile matter	96.42
Nitrogen	.50
Acid digestion:	
C_aO	.47
P_2O_5	.07
K_2O	.13

ANGORA GOATS AT COPPER CENTER.

The following letter from Judge Andrew Holman shows some possibilities regarding Angora goat production in Alaska:

DEAR SIR: Early in August this year we received from Monmouth, Oreg., 26 Angora goats—25 grade ewes and 1 registered buck; for the latter we paid $25, and for the ewes we paid $4 apiece. It took nearly a month to get them here, but they stood the trip better than I had expected; not one showed any signs of exhaustion. But of course they ran down in flesh and were pretty thin when they came here.

They commenced to pick up at once, however, and now they weigh easily 20 per cent more than they did when they came; and the beauty of it is that they are not at all inclined to be roving and give us absolutely no trouble. They have been left entirely to their own free will, but they keep close to their camp. Only once have they gone over 500 yards from camp, and then they were driven by dogs.

It was my fear at first that we should have everlasting trouble with dogs, but we found it took only a few days to train the dogs living around us to let them alone, and the Indians have instructions to keep their dogs away, with which they comply very well. But if they do get after them, they only chase them and the goats run for camp, so we have had very little trouble in that way.

Now, as for the future prospects for their propagation here, I will give my opinion just as I have studied it out. I have come to the conclusion that we have here in the Copper River Valley an almost ideal place for their propagation, as it seems that the most important thing with them is to have a dry climate with plenty of young brush, which is just what they have here. In the first place, most of the land in the valley runs in benches from the Copper River and its tributaries, and all this land, up to quite recently, or until the white man commenced to come in, has been covered with more or less heavy timber. But lately a great deal of it has been burnt off, and as soon as a fire runs through the timber a second growth of cottonwood and willow grows up just as thick as it can stand; consequently there are thousands of acres of such land, seemingly just what the goats want. Of course the most important thing is what they will do in the winter, but this much I have already learned: It is now along in October, and the feed for other kinds of stock is of very little help and has been so for some time, but the goats are doing as well now as they were during the summer, and it will not be any different until the snow gets deep. It is evident, therefore, that if they are not wholly self-sustaining, they are at least much more so than any other kind of stock; and if we have to provide feed for them during midwinter, that can be done much cheaper than for other stock.

Goats are browsers and eat principally brush. I had two natives for two

days to cut and put up this young second growth into bundles, and in two days they put up enough feed to last my 25 goats at least six weeks; it is therefore quite certain that goat raising will be a profitable industry here. It stands to reason that the fleece will be better here than at any other place farther east, because of the climate. As a meat industry it surely will be profitable for a long time to come. A goat will dress from 40 to 60 pounds, and 25 cents per pound here is cheap. From what I have already seen of the experiment, I have concluded to go exclusively into the Angora goat-raising business, with a little farming on the side. Next summer I shall get a couple of hundred more ewes to begin with.

Yours, respectfully, ANDREW HOLMAN.

COPPER CENTER, *October 5, 1905.*

NOTES ON GARDEN AND NURSERY, SITKA STATION, 1905.

APPLES.

DWARF TREES, IN BREWERY LOT.

Sweet Bough: June 1, three trees in good condition. July 1, leaves somewhat affected with a fungus; sprayed with Bordeaux mixture. August 1, 5 inches new growth; leaves somewhat burned by the spray. September 15, trees vigorous, with no indication of leaves falling. October 1, leaves yet green; tips too tender to withstand hard freezing.

Tetofsky: June 1, three trees in good condition. July 1, sprayed with Bordeaux mixture for leaf fungus. August 1, 4 inches growth. September 15, made very little growth since August 1. October 1, tips too tender for hard-freezing weather.

Golden Sweet: June 1, three trees in fine condition. July 1, sprayed with Bordeaux mixture. August 1, 1 foot growth; vigorous. September 1, 18 inches growth; very vigorous. October 1, yet holding the leaves; tips tender.

Primate: June 1, two trees, both looking well. July 1, sprayed. August 1, 6 inches growth. September 15, one tree 18 inches new growth; other tree looks well, but has made little new growth. October 1, not well hardened for winter, yet holding the leaves.

Early Harvest: June 1, three trees, very good. Sprayed on July 1. August 1, 1 foot growth; thrifty. September 15, 2 feet growth. October 1, new wood not hardened sufficiently for winter.

Fanny: June 1, three thrifty trees. Sprayed on July 1. August 1, 2 inches of growth; very backward. September 15, 3 inches growth; trees look vigorous, but have made poor growth. October 1, leaves remain.

Keswicks Codling: June 1, three trees growing nicely. Sprayed on July 1. August 1, 9 inches growth; looking well. September 15, 1 foot growth. October 1, wood yet tender.

Yellow Transparent: June 1, three trees; leaves somewhat affected with fungus; sprayed with Bordeaux mixture. July 1, resprayed. August 1, growth uneven, average 6 inches. September 1, 15 inches growth on two trees; other tree looks well, but made little growth. October 1, tips of new wood very tender.

Red Astrachan: June 1, three trees; doing nicely. Sprayed on July 1. August 1, uneven growth; one tree vigorous. September 15, 1 foot new growth; looking well. October 15, new wood tender.

STANDARD TREES.

Fanny: June 1, five trees; tips of two winterkilled; otherwise all vigorous. August 1, 3 inches of new growth. September 15, 1 foot new growth. October 1, new wood very tender for cold weather.

Golden Sweet: June 1, five trees growing vigorously. August 1, 1 foot growth. September 15, 2 feet new growth. October 1, one tree nearly destroyed by ravens breaking off the branches; others vigorous, but too tender for hard-freezing weather.

Sops of Wine: June 1, five trees growing; do not look vigorous. August 1, 3 inches growth. September 15, 1 foot growth; looking much more vigorous than earlier in the season. October 1, tips very soft.

Summer Rose: June 1, five trees; looking well. August 1, very little new growth. September 15, made but little growth this season. October 1, yet holding leaves.

Sweet Bough: June 1, five trees; doing nicely. August 1, 6 inches growth. September 15, 1 foot growth. October 1, tips of new wood very tender.

Early Strawberry: June 1, five trees; very thrifty. July 15, leaves somewhat spray-burned. August 1, 1 foot growth. September 15, vigorous; 18 inches new growth. October 1, very tender.

Primate: June 1, five growing, but unthrifty looking. August 1, 4-inch growth; looking more vigorous. September 15, 6-inch growth; many leaves for so short a growth. October 1, trees yet holding their leaves.

Williams Favorite: June 1, three trees; rather unthrifty. August 1, 3-inch growth. September 15, 6 inches of growth; not looking vigorous. October 1, new wood tender.

Benoni: June 1, four doing well, one unthrifty. August 1, 1 foot of growth. September 15, 2 feet of growth; very vigorous. October 1, too tender for hard freezing weather.

NOTE.—These trees were all more or less injured by ravens. They were sprayed twice in July with Bordeaux mixture for a leaf fungus and given one washing with a stiff brush, using kerosene emulsion for cottony-cushion scale which had attacked them.

APPLES ON THE STATION GROUNDS.

Duchess (block 1): June 1, seventeen trees; growing but not thrifty. August 1, very backward. September 15, only thirteen trees alive; very poor.

Martha: June 1, eighteen trees; none doing well. August 1, making but little growth. September 15, sixteen trees alive; three have made growth.

Hibernal (block 1): June 1, seven trees very thrifty. August 1, 2 inches of growth. September 15, 6 inches of growth; looking well. October 1, new wood tender.

Whitney Crab: June 1, sixteen trees looking well. August 1, new growth very short, but trees look thrifty. September 15, 1 foot of new wood. October 1, new wood appears too soft for freezing weather.

Red Astrachan: June 1, fifteen trees give good promise. August 1, but little new growth. September 15, more thrifty than earlier in the season. October 1, new wood very short.

Lowell: June 1, twelve trees making feeble growth. August 1, very little new growth. September 15, leaves of good color but short growth.

Tetofsky: June 1, twenty trees look well. August 1, new growth very short; trees look fine. September 15, leaves of good color but growth short. October 15, trees yet holding leaves.

Yellow Transparent: June 1, eighteen trees looking well. August 1, growth

short; leaves spray-burned. September 15, very little growth; leaves of good color. October 1, leaves yet on the trees.

Eureka: June 1, fourteen trees; five give good promise. August 1, all trees about equal; very short growth. September 15, 4-inch growth; good color. October 1, leaves yet hanging.

Sylvan Sweet: June 1, sixteen trees doing nicely. August 1, 3-inch growth. September 15, 4-inch growth. October 1, leaves green; tips very tender.

Byers Sweet: June 1, eleven trees very backward. August 1, all nearly dead. September 15, no growth; leaves have good color. October 1, leaves yet green.

Raspberry: June 1, eighteen trees thrifty looking. August 1, 4 inches of growth. September 15, 6 inches of new growth. October 1, leaves dropping; more promise of hardening new wood than with other varieties.

Red June: June 1, sixteen trees look well. August 1, very little growth. September 15, one tree made 1 foot of new growth; others made but little growth, some being nearly dead.

Maiden Blush: June 1, seven trees; three seem thrifty. August 1, not doing well. September 15, one tree made 12 inches of growth; four nearly dead; two look well, but have made little growth this season. October 1, leaves yet green.

Early Harvest: June 1, sixteen trees; seven thrifty. August 1, very backward; no growth. September 15, three trees made 6 inches of growth; others made no growth though the trees are of good color.

Patten: June 1, seven trees; five of them vigorous. August 1, 4 inches of growth. September 15, very little additional growth. October 1, leaves yet of good color.

Jessie: June 1, seven trees; not doing well. August 1, two trees made 6 inches of growth; others making no growth. September 15, two trees made 15 inches of growth; others look poorly. October 15, wood on vigorous trees too soft for winter.

Hibernal (block 2): June 1, seven trees give good promise. August 1, growth 2 inches. September 15, not doing well. October 1, very poor.

Peerless: June 1, six trees give good promise. August 1, 4 inches of growth; looking well. September 15, 6 inches of growth. October 1, wood very soft.

Yellow Transparent: June 1, nine trees doing nicely. August 1, one tree made 9 inches of growth; others 2 inches. September 15, one tree 18 inches, others from 4 to 6 inches. October 1, leaves yet hanging.

Duchess (block 2): June 1, eight trees; looking well. August 1, new growth very short. September 15, 3 inches of growth; color, good. October 1, leaves yet hanging.

Red June: June 1, three trees making good start. August 1, very little growth. September 15, leaves of good color; no growth. October 1, leaves hanging.

Hyslop: June 1, five trees look vigorous. August 1, have grown very little, but look well. September 15, 18 inches of growth; very strong. October 1, leaves yet retained.

Native Crab: June 1, five trees making good start. August 1, 9 inches of growth; two trees which dropped their leaves after being sprayed have again leafed out. September 15, 15 inches of growth. October 1, leaves have turned and wood promises to harden.

Transcendent: June 1, two trees doing well. August 1, 5 inches of growth. September 15, 8 inches of growth; very good.

NOTE.—All these trees were transplanted this spring (1905) to ground that had been thoroughly plowed, and limed at the rate of 2 tons per acre. They were sprayed twice in July with Bordeaux mixture for leaf fungus.

APPLE TREES GRAFTED AT THE STATION, 1904.

Lowell: June 15, whip graft on native stock growing nicely; crown graft on native stock doing nicely also. August 1, all doing well. September 15, 2 feet of growth; leaves of good color. October 1, wood too soft for hard frost.

Red June: June 1, whip graft on native stock, vigorous looking. August 1, growth very short, looking well. September 15, 6 inches of growth. October 1, tips soft.

Northwest Greening on native crab stock: June 1, growing nicely. August 1, looking well, but growth is slow. September 15, good color; no additional growth.

Okabena, one-year grafts. June 1, growing. August 1, 2 inches of growth. September 15, 1 foot of growth; very good.

Whitney Crab: June 1, giving good promise. August 1, looking well; 3 inches of growth. September 15, two trees very vigorous; others not looking so well.

Princess Louise: June 1, one-year grafts giving good promise. August 15, 4 inches of growth. September 15, 1 foot of growth; good color. October 1, wood very soft.

Duchess, one-year grafts: June 1, giving good promise. August 1, 3, inches of growth; most of them doing poorly.

Hibernal, one-year grafts: June 1, giving little promise. September 15, one tree 6 inches growth; others doing nothing.

Martha: June 1, one-year grafts giving some promise. August 1, growing nicely; 3 inches of growth. September 15, but little additional growth; not looking well.

Walbridge, one-year grafts: June 1, giving promise. August 1, new growth short, but looks well. September 15, one tree 8 inches growth; others appear thrifty, but the growth is short.

North Star, one-year grafts: June 1, giving promise. August 1, 5 inches of growth. September 15, growth 6 inches; doing well.

Patten, one-year grafts: June 1, starting well. August 15, 6 inches of growth. September 15, growth of one tree, 18 inches; others have made no additional growth.

Minnesota, one-year grafts: June 1, well started. August 1, 6 inches growth. September 15, one tree made a growth of 2 feet; others of 9 inches.

Jewett, one-year grafts: June 1, good promise. August 1, 13 inches of growth. September 15, growth 18 inches; very vigorous.

NEW GRAFTS, 1905.

Sixteen hundred trees of many varieties: June 1, very slow in starting, weather being cool and extremely dry. August 1, 70 per cent doing nicely. September 15, all have made good growth. October 1, very few hard enough to stand hard frosts.

Duchess and Tetofsky, top-worked on native stocks are doing well and have made a growth of 2 feet.

Pyrus baccata: June 1, fifteen small trees all doing well. August 1, strong 12-inch growth; very thrifty. October 1, leaves falling; wood promises to harden for winter.

Juneberry: June 1, nine plants making a vigorous start. July 1, strong 8-inch growth; bloom buds set. August 1, 14-inch growth; some fruit set. September 15, 18 inches of growth; fruit ripe. October 1, leaves turning.

CHERRIES.

English Morello, nine trees: June 1, very backward. August 1, one tree dead; others made an average growth of 10 inches. September 15, growth 15 inches; thrifty looking. October 1, leaves yet green.

Ostheim, fifteen trees: June 1, doing well; in bloom. August 1, some fruit set, but dropped when small; 6 inches of growth. September 15, growth 18 inches; trees looking well. October 1, leaves yet retained.

Early Richmond, nineteen trees: June 1, growing nicely. August 1, 5 inches of growth. September 15, three trees not doing well; others made 15 inches growth.

Dyehouse, nineteen trees: June 1, doing well. August 1, 5 inches growth. September 15, 10 inches growth.

Sand Cherry, six bushes: June 1, slow to start. August 1, very thrifty; 15 inches growth. September 15, 18 inches growth.

Compass, four trees: June 1, vigorous start. August 1, 6 inches growth. September 15, growth spindling.

PLUMS.

May Day, three trees: June 1, 4 inches of growth; strong. August 1, growth 15 inches. September 15, two trees very strong; other one not doing so well. October 1, leaves falling.

Forest garden, two trees: June 1, very weak. August 1, growth 8 inches; looking well. September 15, a growth of 1 foot. October 1, leaves falling.

Tomahawk, one tree: June 1, very backward. August 1, growth short, but tree looks well. September 15, 2-inch growth; good color; vigorous. October 1, holding its leaves.

Sayles, two trees: June 1, very weak growth. August 1, 12 inches growth. September 15, leaves yellow; growth 15 inches.

Hawkeye, three trees: June 1, very weak. August 1, 12 inches growth. September 15, 18 inches growth; thrifty. October 1, leaves coloring.

Wyant, two trees: June 1, starting nicely. August 15, 3 inches of growth. September 15, very yellow; growth, spindling, 6 inches.

Odegaard, six trees: June 1, leaves very yellow. August 1, doing well; growth 6 inches. September 15, good strong 8-inch growth. October 1, leaves coloring.

De Soto: June 1, four trees nearly dead. August 1, three trees growing some. September 15, three trees made 15 inches growth and promise well.

Rollingstone: June 1, one tree; making very poor start. August 1, a growth of 15 inches. September 15, 18 inches growth; vigorous. October 1, leaves dropping.

Aitkin, thirteen trees: June 1, doing well. August 1, 12 inches growth. September 15, 18 inches growth; vigorous. October 1, leaves coloring.

Prunus besseyi, fifty trees: June 1, looking vigorous. August 1, 50 per cent looking well. September 15, 6 inches growth. October 1, leaves dropping.

Seedling Americana, one hundred trees: June 1, thrifty. August 1, 6 inches growth. September 15, 15 inches growth; very vigorous. October 1, leaves coloring.

Seedlings of Wyant, twenty trees: June 1, doing nicely. August 1, growth rather spindling. September 15, average growth 15 inches; very vigorous. October 1, leaves coloring.

Seedlings of Cherry Plum, eighty-seven trees: June 1, doing nicely. August 1, a growth of 15 inches. September 15, average growth 18 inches; some 3-foot growths; most trees strong.

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BUSH FRUITS.

High-bush Cranberry, one plant: June 1, growing very well. August 1, very short new growth. September 15, new growth very short, but plants look strong.

Buffalo Berry: June 1, few plants living; very poor. August 1, doing nicely. September 15, new growth short; plants look well.

Sand Cherry (Western): June 1, growing slowly; good promise. August 1, making very vigorous growth. September 15, 12 inches of growth; looking thrifty. October 1, leaves yet green.

CURRANTS.

Red Native from Sunrise, Alaska: June 1, some growing. July 1, very backward. August 1, very little growth. September 15, nearly all dead.

Red Cross, ten plants: June 1, growing nicely. July 1, looking well; 6 inches growth. August 1, 9 inches growth. September 15, leaves falling; 1 foot of growth.

Black Champion, ten plants: June 1, vigorous start; some bloom. July 1, 5 inches growth; no fruit. August 1, 8 inches growth. September 15, 15 inches new growth; leaves coloring.

Lee Prolific, ten plants: June 1, doing well; some bloom. July 1, 6 inches growth. August 1, 10 inches growth. September 1, 15 inches growth. October 1, leaves dying.

Wilder, eleven plants: June 1, thrifty. July 1, 4 inches growth. August 1, 6 inches growth. September 15, leaves coloring.

Russian Black, five plants: June 1, vigorous. July 1, 8 inches growth. August 1, 15 inches growth. September 15, 18 inches growth.

Common Red: June 1, growing nicely. July 1, 6 inches growth. August 1, 12 inches growth. September 15, not vigorous.

Ruby Castle, seventeen plants: June 1, doing nicely. July 1, 3 inches growth. August 1, very little additional growth. September 1, plants do not appear thrifty.

Black Currants, twenty-five plants: June 1, good growth; in bloom. July 1, 15 inches growth; leaves somewhat affected with fungus—sprayed with Bordeaux mixture. August 1, 20 inches growth. September 15, leaves coloring.

Native Currant: June 1, growing vigorously. July 1, strong growth. August 1, 5 inches growth. September 15, leaves coloring.

Amber-Colored, four plants: June 1, growing nicely; in bloom. July 1, 10 inches growth. August 1, 15 inches growth. September 15, leaves dropping.

Victoria, eighteen plants: June 1, thrifty; in bloom. July 1, 8 inches growth. August 1, fruit small, ripe; 12 inches growth. September 15, leaves falling.

Crandall, five plants: June 1, vigorous growth; in bloom. July 1, some fruit set; 6 inches growth. August 1, fruit not good; 10 inches growth. September 15, strong plants; leaves falling; 2 feet of growth.

Fay Prolific, two bushes: June 1, thrifty growth; in bloom. July 1, fruit set; 5 inches growth. August 1, 8 inches growth. September 15, leaves falling.

White Currant: June 1, growing well; in bloom. July 1, fruit set; 5 inches growth. August 1, 8 inches growth; very little fruit. September 15, plants thrifty; leaves falling; 1 foot of new growth.

Currant cuttings of various varieties, 3,500 plants: June 1, doing very well. July 1, making fair growth. August 1, not making the desired top growth. September 15, top growth rather short; excellent root system developed.

BLACKBERRIES.

Snyder, one plant: June 1, growing nicely. July 1, making slow growth. August 1, 8 inches growth. September 15, too tender for winter weather.

Taylor, seventeen plants: June 1, looking well. July 1, making good growth. August 1, new canes 15 inches long. September 15, canes short, will require winter protection.

RASPBERRIES.

Turner, twenty plants: June 1, not vigorous. July 1, have better color; in bloom. August 1, new canes long. September 15, no fruit; canes 3 feet tall; very tender.

Miller, twelve plants: June 1, growing slowly. July 1, making slow growth; few bloom. August 1, new canes 18 inches long. September 15, canes 2 feet long, but too tender for freezing weather.

London: June 1, making good growth. July 1, in bloom; growing slowly. August 1, new canes 2 feet long; fruit poor. September 15, 3-foot canes; very tender.

Red Raspberries (common) grown for propagating only: Have done exceedingly well.

GOOSEBERRIES.

Whitesmith, nine plants: June 1, vigorous; in bloom. July 1, average growth 10 inches; no fruit set. August 1, 15 inches growth. September 15, little additional growth; leaves coloring.

Columbus, eight plants: June 1, growing nicely. July 1, average growth 2 inches; very backward; good color. August 1, 5 inches growth. September 15, 10 inches growth; one plant much more vigorous than the others.

Industry, eight plants: June 1, making good start. July 1, good color; making slow growth. August 1, 3 inches growth. September 15, unthrifty. October 1, leaves dropped.

Smith Imperial, five plants: June 1, thrifty start. July 1, 6 inches growth. August 1, very little additional growth. September 15, 1 foot of growth.

Red Jacket, six plants: June 1, vigorous start. July 1, 4 inches growth. August 1, 6 inches growth. September 15, 14 inches growth. October 1, leaves coloring.

Triumph, five plants: June 1, doing well. July 1, good color; very little new growth. August 1, 3 inches growth. September 1, 6 inches growth. October 1, leaves well colored.

English, six plants: June 1, vigorous. July 1, growing nicely; some fruit. August 1, growing slowly. September 15, new growth very short; fruit ripened. October 1, leaves dropping.

Houghton, eighteen plants: June 1, growing nicely; in bloom. July 1, fruit well set; medium size. August 1, 3 inches growth. September 15, fruit ripened; very little additional growth. October 1, leaves dropping.

Champion, thirteen plants: June 1, vigorous, in bloom. July 1, very little fruit set; 3 inches growth. August 1, 5 inches new growth. September 15, 6 inches growth.

STRAWBERRIES.

Bismarck: June 1, growing nicely; in bloom. August 1, fruit ripening; plants vigorous. September 15, many new plants. October 1, young plants in abundance. This is the best variety grown at this station.

Enhance: June 1, in bloom. August 1, no berries set, plants growing nicely. September 15, vigorous new plants.

Michigan: June 1, growing nicely; plants blooming. August 1, no fruit; plants making vigorous growth. September 15, strong new plants; promising.

Saunder: June 1, in bloom. August 1, fruit ripening; poor. September 15, many new plants.

Native: June 1, vigorous growth; in bloom; perfect flowers. August 1, no fruit; Vigorous growth. September 15, new plants in abundance.

ORNAMENTALS.

Caragana arborescens: June 1, doing well. August 1, growing slowly. September 15, plants look well; very short growth.

Caragana microphylla: June 1, not thrifty. August 1, growing slowly. September 15, few plants growing.

Eglantine, nine plants: June 1, doing well. August 1, making vigorous growth. September 15, 18 inches growth; very strong.

Lilac (common), six plants: June 1, growing nicely. August 1, very short new growth. September 15, new growth very short; plants look strong.

Lonicera alba rosea, four plants: June 1, growing nicely. August 1, 6 inches growth. September 15, 8 inches growth; good color.

Lonicera bella albida: June 1, starting nicely. August 1, 4 inches growth. September 15, vigorous strong plants; 10 inches growth. October 1, leaves yet hanging.

Lonicera tatarica rosea: June 1, started well. August 1, 5 inches growth. September 15, plants strong and vigorous; 15 inches growth.

Lonicera tatarica splendens: June 1, thrifty growth. August 1, 6 inches growth. September 15, strong vigorous plants, 15 inches growth. October 1, yet holding the leaves.

Lonicera tatarica, twelve plants: June 1, not thrifty. August 1, making slow growth. September 15, growth very short; not doing well.

Lonicera tatarica grandiflora: June 1, growing nicely. August 1, 3 inches of new growth. September 15, plants strong; 15 inches growth.

Mountain Ash: June 1, thrifty. August 1, 3 inches growth. September 15, very little additional growth.

Niobe Willow: June 1, doing nicely. August 1, 15 inches growth. September 15, 3 feet of growth. October 1, wood too soft for hard freezing weather.

Rosa rugosa: June 1, doing nicely. August 1, growing slowly. September 15, 8 inches growth; doing very well.

Siberian Sandthorn: June 1, not vigorous. August 1, very little growth. September 15, very backward.

Speer Elderberry, four plants: June 1, just starting growth. August 1, 8 inches growth. September 15, 1 foot of growth. October 1, wood too soft to stand hard freezing weather.

Ural Willow, six plants: June 1, growing vigorously. August 1, 6 inches growth. September 15, 10 inches growth. Cuttings of this have made a strong growth this season.

VEGETABLES.

The season was on the whole quite favorable to the growth of vegetables and the commoner sorts—potatoes, turnips, radishes, lettuce, etc.—did very well. (Pl. VII, fig. 1.) Excellent reports have been received from various parts of the Territory. These are noted under reports from the seed distribution.

At the Sitka Station the soil continues to be so uneven in quality that the

experiments we have undertaken with vegetables are not reliable. The soil is acid and requires to be dressed with a still heavier coating of lime than has been so far applied. A summary of the results obtained follows:

BEANS.

Broad Windsor (seed procured from a Seattle seed house): Of this three rows were planted. They all grew splendidly, attained a height of 3 to 4 feet, and were loaded with pods, which were ready for use in the latter part of September, but none of the seed matured.

A few beans of each of many varieties sent to the station from the Department of Agriculture for trial were also planted, but none of them compared to those raised as above stated. Many of them failed to grow and none of them amounted to anything worth mentioning. These varieties were imported from Europe and elsewhere. They were sent out under the following numbers: 2455, 2463, 2465, 2466, 10413, 10414, 10415, 10416, 10431, 10432, 10433, 10435, 10437, 10440, 10443, 10436, 10445, 10434, 10430, 10438, 10418, 10441, 10432.

Wax beans, Pole beans, and Lima beans were not tried, as they have heretofore proved unsuccessful.

BEETS.

Early Egyptian: A short row was planted and did very well, making roots from 3 to 4 inches in diameter.

French White Sugar: A short row of this variety was planted, but it proved a failure.

BROCCOLI.

Large White French: Seed sown in cold frame April 22, producing strong plants, which were set in open ground June 9. Plants set in a small plat of good garden soil developed heads of good size, 6 to 7 inches in diameter. Other plants set in soil not so good developed only very small heads.

BRUSSELS SPROUTS.

Dwarf Improved: Seed sown April 20, with cabbages in flats—that is, shallow boxes in the greenhouse. Only 40 per cent of the seed grew. The plants were set out the first week in June and developed satisfactorily. Brussels sprouts can be grown successfully in the Alaska coast region.

CABBAGE.

All the following varieties were sown in shallow boxes on April 20. These boxes were kept under glass in the greenhouse, which, however, was not heated artificially. They made a good growth. In the middle of May the boxes were set outdoors to harden the plants. This gave us good strong plants by June 1, and they were transplanted between June 1 and 8. One hundred plants of each variety were set out with a view to comparing the different sorts. The experiment was only a partial success, because the soil at the station is not yet in proper condition for culture; although it has been limed it remains acid and is very spotted in character. Early, medium early, and late varieties were represented in about equal numbers.

Extra Early Express: Many plants failed to head. September 1 a few heads were ready for use, but they were small, averaging but 2 pounds in weight.

Early Spring: September 1, a few heads were ready for use. They averaged but 1 pound each, and many plants failed to head.

Early York: This variety did better than either of the two foregoing, though some plants failed to head. By September 1 the heads then ready averaged 3 pounds in weight.

Henderson Early Summer: A larger proportion produced heads, though they were not solid. They were later than those already named and averaged but 2 pounds in weight, though some of the best weighed 4 pounds.

All-Head Early: Only 20 per cent formed heads, but these were good and solid. By November 1 they averaged 3 pounds in weight, and some of the best weighed 5 pounds.

Early Etampes: A French variety. Nearly half of the seed failed to grow. By September 1 a few heads were large enough for use. Some of them weighed 4 pounds each.

Early Large York: Only 30 per cent of the plants headed. By October 15 some of the heads were large enough for use. The best weighed 6 pounds each. Most of them were small but solid.

Early Dwarf Savoy: About 40 per cent of the plants headed. The growth was slow; none were ready for use until November 1, when the largest averaged 3½ pounds.

Early Jersey Wakefield: Of all the early varieties in the tests made at the station up to this time, this is on the whole the most satisfactory. It is a reasonably sure header, although the heads are small. The plants are large and spreading, and one is led to expect larger heads from the size of the leaves. But all things considered, it is a fairly reliable sort. In the present test 70 per cent of the plants produced heads. It is not the earliest sort; none were ready for use until the middle of October, and they continued to grow until November 8. A few heads reached the weight of 5 pounds; 33 heads averaged 3 pounds; the rest were still smaller.

Early Drumhead: Only 40 per cent headed. The growth was slow and they were not ready for use until the last of October. Average weight of heads, 3½ pounds.

Early Dwarf Flat Dutch: A small variety that did not prove to be highly commendable. Its growth was slow; the heads were small, but solid.

All Seasons: About 40 per cent of the plants of this variety produced small heads. The largest weighed 5 pounds.

Premium Drumhead: Only about 30 per cent of this variety produced marketable heads. The largest weighed 2½ pounds. Growth was slow.

Sure Head: Its growth did not justify its name in this case. Less than 30 per cent of the plants formed heads, and these were small and soft.

Short-Stemmed Brunswick: Growth was slow and the heads were small, but they were of even size and quite firm. About 75 per cent of the plants headed.

Fottler Drumhead: Did very poorly throughout. Only 25 per cent of the plants headed. The growth was slow and backward. The best head weighed 3 pounds.

Winningstadt: Has been grown at the station before, and has been more satisfactory in former years than the present season. It produces firm, conical heads of small size. Only 30 per cent of the plants headed.

Charleston or Large Wakefield: Similar to Jersey Wakefield but later and did not do so well as that variety. Average weight of heads, 2 pounds.

Succession: Only a small percentage of plants formed heads and the best of these weighed 3 pounds.

Danish Bald Head: This did not prove a success. Only a small percentage of the plants headed and the heads were very small.

Drumhead Savoy: It was backward and many plants failed to head, and the heads which did grow were not solid.

Large Late Flat Dutch: Though only 30 per cent of the plants headed, this appeared, nevertheless, to be a promising sort. The best head weighed 6 pounds.

As stated at the outset, it would not be fair to pass judgment on this test. The soil is to blame, and it requires time to get the raw peaty soil into condition to produce fair garden crops.

CAULIFLOWER.

The following six varieties were grown: Early London, Early Snowball, Early Favorite, Extra Early Dwarf Erfurt, Early Paris, and Le Normand Short Stem. Like the cabbages, these were sown in flats April 24, kept under glass in a cold greenhouse until the middle of May, and then gradually hardened. Transplanted June 6. In a small patch of good garden soil in town they did well, but those planted on station ground produced but small heads. Those grown on good soil gave results as follows:

Early Snowball: An early and sure header, of even size, and of excellent quality. They were ready in early August.

Extra Early Dwarf Erfurt: A desirable variety but somewhat uncertain. Several plants failed to head.

Early Paris: A fairly good variety.

Early Favorite, Le Normand Short Stem, and Early London: These ranked about together. Early London produced large plants, several of which failed to head and the heads produced were small.

CARROTS.

All the following varieties were planted May 18 and gathered October 9:

French Forcing: This is a short stump-rooted variety producing small roots, but they grew to normal size and can be recommended for early use.

Half Long Scarlet: This variety likewise grew to normal size and was on the whole satisfactory.

Ox Heart: Made a slow growth and yielded but few and small roots. It is not so good as either of the foregoing.

Chantenay: This variety has given good satisfaction at Sitka Station in former years. The present year it did not do so well owing to the soil in which it grew, but it has done well in other parts of Alaska.

Half Long Stump-Rooted: This, too, grew in poor soil, but it made a satisfactory yield and was ready for use in August. It can be recommended for Alaska.

CELERY.

Improved White Plume: The past season this variety gave very good satisfaction. It was grown in the cold frame where the soil was rich, but it will also develop normally in the open ground. By September 15 the plants in the cold frame were nearly ready to blanch.

KALE.

Tall Green Scotch and Dwarf German: The plants were started in flats in the same manner as the cabbage plants and transferred to open ground early in June. They developed normally. Kale is one of the crops than can be grown with certainty in Alaska, and when properly cooked there is no more delicious form of greens than Scotch kale. It should be grown in every garden in the Territory.

PARSNIPS.

Hollow Crown: This is a standard variety. In good soil it develops large tender roots. The present year roots 2½ inches in diameter were grown.

PEAS.

Half the pea crop was treated with a commercial inoculating preparation, in order to ascertain the effect, if any, on the yield.

Alaska: Planted May 18. July 1, 2½ feet high, and in bloom by July 15. Pickings were made at various intervals from August 1 to 25. The total yield of pods from a row 60 feet long weighed 21 pounds. The same variety not inoculated developed normally, and there was but little, if any, difference in appearance between those treated and those not treated; but there was a decided difference in yield. A 60-foot row not treated yielded 15¼ pounds.

First and Best: Seed inoculated. Planted May 18. July 1, 2½ feet high and beginning to bloom. They appeared to be a little in advance of Alaska. A 60-foot row yielded 23 pounds between August 1 and 25. Yield of a 60-foot row planted alongside but not treated was but 14 pounds. This and Alaska variety have been very satisfactory at the Sitka Station, and can be recommended for use in Alaska.

Marblehead Mammoth: Planted May 18. July 1, 3 feet high. July 15, a few blossoms showing. August 1, 5 feet high and in full bloom. Pods ready for use August 17. Between this date and September 19 a 60-foot row yielded 42½ pounds. The seed was not inoculated. The pods of this variety were affected by a fungus growth, which did not attack other varieties growing alongside of it. It is a later and larger sort than the two first named, but it also appears to give heavier yields.

Premium Gem: Seed planted May 18. July 1, 2 feet high. Beginning to bloom August 1. Made but poor growth; only a few pods were large enough for use; was almost a failure. The yield of a 60-foot row was 4½ pounds.

POTATOES.

The following varieties were grown: Extra Early Ohio, Early Ohio, Freeman, Burbank, Hamilton Early, Extra Early Triumph, Banner, Lincoln, Early Harvest, Bovee, Red River White Ohio, White Mammoth, Pat's Choice, Extra Early Pioneer, Early Michigan, Vornehm, Vigensia, Irish Cobbler, Ohio Junior, White Beauty, Early Andes, Garfield, Extra Early, Carman No. 3, White Kenai, and Red Kenai.

Most of these were grown on a very small scale. The seed was procured by the pound, and only from 1 to 4 pounds were planted, and the yields of these small plats can not be compared with any profit. Those grown on a larger scale from seed raised at the station the previous year were Freeman, Garfield, Burbank, White Kenai, and Red Kenai. Of these the Freeman was by far the best, one-nineteenth of an acre yielding 1,446 pounds, or at the rate of 550 bushels to the acre, and 94 per cent of the crop was marketable.

Burbank: Yielded at the rate of 288 bushels per acre, and 86 per cent of the crop was marketable.

Garfield: Yielded at the rate of 54 bushels to the acre, of which 80 per cent was marketable.

White Kenai: Yielded at the rate of 117 bushels per acre, of which 65 per cent was marketable.

Red Kenai: Yielded at the rate of 89 bushels to the acre, of which 76 per cent was marketable.

This great difference in yield is partly due to inequalities in the soil, a condition we have not yet been able to rectify, but in the main the difference is due to the varieties. Up to this time the Freeman is the best potato grown at the station. It is medium early, white, oblong, of medium size and quite uniform, shallow eyes, and excellent quality, being dry and mealy when boiled. The two varieties—named, respectively, the White and Red Kenai—were obtained from the village of Kenai, on Cook Inlet, where it was claimed that they had been grown by the Russian settlers for at least fifty years. These potatoes have no special merit, except the fact that they have been thoroughly acclimated, but they are not early, nor are they of first quality.

It is to be noted that seed potatoes imported from the States usually do not do well the first year. They do not compare in yield or vigor with potatoes of the same varieties raised from Alaska-grown seed. This fact has been observed also by many settlers, who have commented upon it. The varieties here named will be grown again next year from the present crop of seed, and it will then be possible to make a better estimate of their comparative value.

KOHL-RABI.

Planted in open ground May 15. By September they gave promise of a fair crop, and October 8 we gathered 124 pounds of marketable roots from 280 feet of row, which was a very small yield.

RUTA-BAGA.

Purple Top Yellow Swede: Seed planted in open ground May 15. October 8, 210 pounds of marketable roots were gathered from 280 feet of row.

TURNIPS.

No. 1678, Imported Finnish Seed: Seed sown May 15. The crop yielded 160 pounds of marketable roots from 140 feet of row. This is a small white turnip of good quality. No. 6176, Imported Finnish Seed: Seed sown May 15. Yield, 240 pounds of marketable roots from 120 feet of row. This is a small yellow turnip of very fine quality.

WORK AT THE COPPER CENTER STATION.

OUTLINE OF OPERATIONS.

Since the last report little has been done in the way of building, except the addition of a shed, 14 by 30 feet in size, on the south side of the barn, which is ready for the roof; also a frost-proof root cellar is nearing completion.

Having no help from October until February, when the freighting season opened, the superintendent spent his time in making the cabin (Pl. IV, fig. 1) and barn a little more comfortable for cold weather, whipsawing some lumber, building a hay press, making a roll-top office desk, baling and freighting 5 tons of native hay from Willow Creek to the station, and freighting 1,900 feet of lumber 20 miles down the Klutena River.

The frost being sufficiently out of the ground, stirring the soil was begun April 25. The first plats were seeded May 9, as 25 acres were then ready for the drill. The last seeding was done May 25. Thirty acres were seeded to the various grains, 3 acres of which were seeded to awnless brome grass (*Bromus inermis*).

After the seeding was done attention was given to clearing and breaking 4 acres of low wet ground for the purpose of seeding it to timothy and other grasses. Seven acres of new ground which had already been broken, with the 3 acres broken later, make 14 acres of new ground broken this season. There are now 36 acres of ground broken and about 5 acres cleared, which could not be broken until the ground became too dry. The 4 acres broken for grasses could not be got in shape in reasonable time for seeding, and it was thought best to defer seeding till next spring, and at the same time sow oats or some kind of grain with the grass seed. Clearings of last year had to be fenced, and it was also due time to fence off the pasture lands, as travel is rapidly increasing from year to year over this trail. Enough stock passed here this season to graze off our entire pasture in a single day; the last herd of beef cattle passing numbered 76 head.

One mile of barbed-wire fence was built, two-thirds of a mile of stake-and-rider fence, and a picket fence inclosing about 1 acre around the cabin. The yard was then cleared of moss, plowed, graded, and laid out with 5-foot walks to be graveled and the remainder seeded to grass, leaving a good-sized kitchen garden on one side and a small grass plat in the rear.

WEATHER CONDITIONS.

This season has varied somewhat from either of the two previous years of our field operations. The precipitation has been so light that crops made very short growth. Even the wild grasses in open places were seen to be withering in midsummer and did not make their usual growth.

The snowfall was also very light last winter, amounting to but 25§ inches, making but 1.64 inches actual precipitation of melted snow. The rainfall from the last snow until September 1 was but 3.05 inches, and this was distributed in light showers, usually just laying the dust and doing crops little good.

Other conditions remained very favorable to growing crops until August 1, when cool, damp, cloudy weather set in. From this time on most of the grains made very little advance toward ripening. August 14 the temperature fell to 26° F. on the main bench and 23° F. on the upper bench, seriously injuring the crops. This frost was followed by killing frosts on August 19, 21, and 24, the coldest being 20° F. on the lower bench and 16° F. on the upper bench.

CULTURE WORK AND FIELD NOTES.

It is becoming apparent that grain growing is not to be the chief industry in this section of the Copper Valley, owing to the early frosts, and especially those through the month of August. However, under usual conditions, any amount of rough feed can be grown. Crops were light this year owing to the lack of rain.

It has been thoroughly demonstrated for the third time that new land broken and seeded the same year does little more than return the seed sown, and even this is difficult to save on account of short growth. New land, however, may be made to produce heavy crops by using some fertilizer. Experiments this year, in almost every instance, proved that new ground just broken and fertilized with guano at the rate of 500 or 600 pounds per acre—the greater amount giving the best results—produced from 50 to 90 per cent better crops than where no fertilizer was used. Where brush or logs were burned in some quantity, the result was about the same as where the fertilizer was used. Third-year ground also responded to fertilizers, but of course not to so marked a degree. Wherever the fertilizer was used the growth was more vigorous and the crops

U. S. Dept. of Agr., Bul. 169, Office of Expt. Stations.

FIG. 1.—STATION BUILDING.

FIG. 2.—FALL PLOWING.

FIG. 3.—BARLEY FIELD.

FIG. 4.—SWEDISH SELECT OATS.

VIEWS AT THE COPPER CENTER STATION.

had a better color from the first, and invariably the heads were much larger and the growth more uniform on both old and new ground. On these fertilized plats and burned spots the grain stood well, and this dry season I counted as many as 18 large heads from one grain of barley and 26 heads from one grain of oats where the seed was scattered sparingly. New ground broken and let lie to the weather one year gave very good returns even in this dry year. (Pl. IV, fig. 2.) It produced fully 1 ton of hay per acre, while third-year ground alongside the summer-fallowed new ground did not produce more than half that amount. It should be said, however, that this summer fallow was very rich sod and more capable of holding moisture than the old ground.

For convenience in this report the several tracts seeded are designated as follows:

Tract A, third-year ground, used last season as the main culture tract. The soil is rather light and dry.

Tract B, third-year ground on the same bench, but heavier soil.

Tract C, new ground on a bench probably 150 feet higher than tracts A and B. This soil is somewhat heavier than the majority of that on the lower bench, having more of a clay subsoil.

Tract D represents the large field plats on either bench.

On tracts A, B, and C half of each plat or variety was fertilized at the time of seeding with guano, at the rate of about 500 pounds per acre. Tract A was laid out exactly as last year in order to refertilize a portion of each plat, leaving a portion of last season's fertilizing undisturbed, and fertilizing half of the ground not fertilized last year, leaving the remainder unfertilized from the beginning. The fertilizer used was the same kind and quantity each year. There being no visible results from the fertilizing of last year on the present crop, there is no mention of that fertilizing in my notes on this year's crop.

Tracts A and C were seeded with a small hand drill. Tract B was seeded in open drills by hand and covered with a hand rake. Tract D was seeded with a horse drill unless otherwise mentioned. In tract D the summer fallow mentioned is a deep black soil on the willow ground, broken in the fall of 1903 and not seeded last year.

The results of the fertilizer experiment on tract C were in some measure obscured, owing to the fact that the tract was new ground broken before the small culture tract was selected, and unfortunately a portion of the tract had considerable brush burned on it, the effect of which was in evidence as soon as the grains were up a few days. Therefore, the unfertilized portions gave much better results than they otherwise would have done, judging from the growth over the main field.

WHEAT.

Kharkov Winter: Sown August 3, 1904. Seed germinated very quickly, making a good stand, and covered the ground with the vesture of an eastern wheat field by the end of September. Spring growth started early in May. The fall growth was nearly all dead, but by June 1 the drills were again thickly covered and some stood 5 or 6 inches high. A few spots, however, were suffering from drought and winter injury. June 15, 8 to 10 inches of height had been gained, and the grain looked well. July 1, 16 to 18 inches high; some heads showing; the soil getting very dry. July 15, grain 20 to 38 inches high; the blooms falling and the grain forming. July 28, the grain well filled and nearly in the milk. August 14, grain in dough and beginning to harden when injured by a heavy frost. The straw was turning and ripened very rapidly after the frost. Several severe frosts followed within a few days. This grain was cut for thrashing, as it is thought some grains will grow.

Padui No. 9129: A bearded variety of winter wheat, seeded July 16, 1904. It acted about the same as the Kharkov, except that much of this variety was winterkilled, and it was not quite so far advanced when injured by the same frost.

Romanow: Sown in tract A, May 9. The seed germinated rather slowly, and probably only 75 per cent came up. May 24, coming up. July 1, that on fertilized ground was 16 to 17 inches high; that on unfertilized, 12 inches high. August 14, spoiled by frost. No seed matured. The fertilized ground produced fully 25 per cent more straw than the unfertilized.

Saskatchewan Fife: Sown in four different plats.

Tract A.—Seeded May 10. May 23, coming up. July 28, on fertilized portion averaged 28 inches high, best 30 inches high; on unfertilized, 18 inches high; grain two-thirds filled. August 14, frosts spoiled the grain and no seed matured. This variety, as with all the wheats in tract A, was sufficiently matured for good hay by August 30, and when cut cured very quickly.

Tract B.—Seeded May 25. June 3, coming up. July 29, that on fertilized ground averaged 30 inches high; best, 36 inches high; that on unfertilized ground averaged 24 inches high. August 14, grain about filled when spoiled by frost.

Tract C.—Seeded May 23. June 1, coming up. July 28, on fertilized portion, averaged 38 inches; best, 40 inches; on unfertilized, averaged 20 inches. August 14, frost spoiled the grain when about filled. September 1, cut for hay. The fertilized plat yielded about 50 per cent more straw than the unfertilized.

Tract D.—Seeded May 10, with horse drill on both old ground and summer fallow of the first seeding. Coming up May 23. July 28, 24 inches high on the old ground and the grain a little more than half filled, heads rather small; on the summer fallow, straw very thick on the ground, standing 38 inches high and about heading, grain just forming. August 14, frost spoiled the grain. At that date, most of the grain on old ground was in the dough.

Velvet Chaff Blue Stem: This variety was also sown in four different tracts.

Tract A.—Seeded May 10. Coming up May 23. July 28, best 38 inches high, average 34 inches on the fertilized plat, grain about half filled; on unfertilized plat, average 24 inches high, heads smaller, and the grain not so much filled. August 14, frost spoiled the grain. Would have ripened in a few days of favorable weather.

Tract B.—Seeded May 25. Coming up June 2. July 29, the best was 36 inches high, the average 33 inches, on the plat fertilized; on the unfertilized, average height about 20 inches, grain just forming. August 14, the grain was about filled when spoiled by frost.

Tract C.—Seeded May 23. Coming up June 1. July 28, on fertilized ground, averaged 36 inches high, best 40 inches high; on unfertilized, averaged about 26 inches, grain just forming. August 14, frosts spoiled the grain when about filled.

Tract D.—Seeded May 10 on both old ground and summer fallow of the first seeding. Coming up May 23. July 28, 18 to 24 inches high on the old ground, and the grain about half filled, heads small; 30 to 40 inches high on the summer fallow and the grain nearly one-third filled. Frost spoiled the grain August 14. The grain on the old ground was well filled and in the dough. That on the summer fallow was several days later, the growth rank and yet green.

Early Riga: This variety was sown May 10 only in tract A. Coming up May 23. July 28, the grain was well filled and about in the milk. August 14, the grain was in the dough when spoiled by a heavy frost. A few heads were nearly matured.

Romanow, No. 8892: This variety was seeded in four different tracts.

Tract A.—Seeded May 10. Coming up May 24. July 28, the best was 31 inches high, averaging about 30 inches on fertilized plat, grain being well filled and nearly in the milk; on unfertilized, averaged about 24 inches, and a day or two later in filling. August 14, spoiled by frost.

Tract B.—Seeded May 25. Coming up June 3. July 29, the best was 42 inches high, averaging about 40 inches on the fertilized plat, grain half filled; on unfertilized, averaged about 28 inches high, grain one-third filled. August 14. spoiled by frost.

Tract C.—Seeded May 23. Coming up June 1. July 28, best 44 inches high, with an average of 42 inches on the fertilized plat,; on the unfertilized, averaged about 23 inches high. The grain was one-third filled. August 14, spoiled by frost.

Tract D.—Seeded May 10 on old ground and summer fallow of the first seeding. Coming up May 23. July 28, 18 to 24 inches high on the old ground, grain about half filled; on the summer fallow, 30 to 40 inches high, headed, and the grain one-third filled. August 14, the grain on the old ground was in the dough and well filled when spoiled by frost; that on the summer fallow was some days later.

Romanow, seed of first importation: A small amount of this seed was held over from last year's seeding. Sown on tract A May 10. Coming up May 25. July 28, 35 to 38 inches high; grain about two-thirds filled; heads of fair size and quite uniform. August 14, grain well filled and in dough when spoiled by frost.

Romanow, imported seed: Sown on tract A May 10. Coming up May 25. July 28, 30 inches high; grain about two-thirds filled. August 14, the grain was well filled and in the dough when spoiled by frost.

Romanow, Sitka Experiment Station seed: Two plats of this variety were sown.

Tract B.—Seeded May 25. Coming up June 3. July 28, on the fertilized portion the best was 40 inches high, with an average height of 36 inches, and the grain was one-third filled; on the unfertilized portion average height about 28 inches, and the grain was filling a little later. August 14, spoiled by frost.

Tract C.—Seeded May 23. Coming up June 2. July 28, on the fertilized ground the best was 38 inches high, with an average height of 36 inches; grain about filled; average height on the unfertilized, 27 inches, and grain filling a day or two later. August 14, spoiled by frost.

Stanley: This variety was sown in tract A only on May 10. Coming up May 23. July 28, on the portions fertilized the best was 34 inches high, with an average height of 33 inches, grain being about three-fourths filled; on the unfertilized, average height, 24 inches, filling at about the same stage. August 14, spoiled by frost.

Ladoga: This variety was sown in tract A only on May 10. Coming up May 22. July 28, on the fertilized portion, the best was 28 inches high, with an average height of 26 inches; on the unfertilized, average height, 20 inches. This variety was so far advanced that some heads matured fair grain.

Preston: This variety was sown in tract A only on May 10. Coming up May 24. July 28, on the portion fertilized, the best was 34 inches high, with an average height of 32 inches; average height on the unfertilized, 26 inches. August 14, the grain was well filled and in the dough when spoiled by a frost.

Ebert: Sown in tract A May 10. Coming up May 24. July 28, the average height on the portion fertilized was 30 inches, the grain being about two-thirds filled; on the unfertilized, average height about 22 inches. August 14, grain just in the dough when spoiled by frost.

Plumper: This variety was sown on 3 tracts, A, B, and C.

Tract A.—Sown May 10. Coming up May 25. July 28, on the portion fertilized, the best was 30 inches high and the average 28 inches, grain more than two-thirds filled; on unfertilized, average about 23 inches high, grain filling a little later. August 14, grain in the dough when spoiled by a frost.

Tract B.—Seeded May 25. Coming up June 3. July 29, the fertilized portion averaged 36 inches high, grain one-third filled; the unfertilized averaged 26 inches high, grain filling a little later. August 14, spoiled by a frost.

Tract C.—Seeded May 23. Coming up June 2. July 28, that on fertilized ground averaged 38 inches, the best 40 inches; that on unfertilized averaged 26 inches, grain about half filled. Spoiled by frost.

Glyndon No. 661: This variety was also sown on three tracts.

Tract A.—Sown May 10. Coming up May 25. July 28, that on fertilized ground averaged 30 inches high, best 32 inches high, grain half filled; average height on unfertilized ground was about 27 inches, grain one-third filled. August 14, the grain was in the dough and spoiled by a frost.

Tract B.—Seeded May 25. Coming up June 3. July 29, on fertilized plat averaged 35 inches high, best 38 inches high; on unfertilized averaged 24 inches high, grain just forming. August 14, frost spoiled the grain.

Tract C.—Seeded May 23. Coming up June 2. July 28, the best 36 inches high on the fertilized portions, average height 33 inches; on the unfertilized, average 18 inches high, headed and blooming. Spoiled by frost when about filled.

Harold: Sown in three different tracts, as follows:

Tract A.—Seeded May 10. Coming up May 24. July 28, average 27 inches high on the portions fertilized; on the unfertilized averaged 20 inches high. August 14, grain injured by frost, but some heads were so far advanced that the grain seemed to have escaped without injury. The crop was cut for seed.

Tract B.—Seeded May 25. Coming up June 3. July 29, that on fertilized portions averaged 34 inches high, that on unfertilized ground averaged 26 inches high. Grain one-fourth filled when killed by frost.

Tract C.—Seeded May 23. Coming up June 2. July 28, that sown on fertilized ground averaged 43 inches high, on unfertilized 26 inches high; grain just forming on both plats. Spoiled by frost.

Kubanka: This variety was sown in two tracts.

Tract B.—Seeded May 25. Coming up June 4. July 29, fertilized 34 to 40 inches high, grain just forming; unfertilized 20 to 26 inches high; grain the same. Spoiled by frost

Tract C.—Seeded May 23. Coming up June 2. July 28, fertilized 40 to 46 inches high; unfertilized 20 to 24 inches high; grain just forming in both. No seed matured.

Russian wheat, No. 2955: Sown on tract C May 23. This seed was old and germinated very slowly. June 15, a small percentage was up 3 inches high. July 28, that on fertilized ground was 20 to 30 inches high; on unfertilized 12 to 18 inches high; grain just forming in both. No seed matured.

Of all the wheats tried this year Ladoga and Harold were the furthest advanced when the first killing frost came. These two varieties matured many heads sufficiently for making flour, and a part of the seed will grow. But even of these varieties the greater portion was spoiled by frost. Next to these was Ebert, with many heads almost matured. Plumper, Stanley, Early Riga, and Roumanian were next, with many heads nearly ripe. These were all on tract A, the earliest seeded.

BUCKWHEAT.

Silver Hull: Home-grown seed from 1903 crop was sown on tracts B and C with the following results:

Tract B.—Sown May 25. Coming up June 3. July 15, excellent color and filled with bloom. The fertilized portion was slightly injured July 19 by frost, the top leaves being killed. Nothing else on the station showed any effects of this frost. The minimum temperature registered was 34° F. on that date. July 29, partially recovered injury from the frost and was in full bloom. August 14, killed to the ground by frost; some seed had nearly matured.

Tract C.—Seeded from the same seed May 23. Coming up June 3. July 28, about the same on both plats, being 20 to 24 inches high, covered with bloom. August 14, killed to the ground by frost; some of the grain was almost matured.

RYE.

Schlansted Winter: Sown July 16, 1904. Did not come up. The seed evidently was old.

Excelsior Winter: Sown July 16, 1904. Came up quickly and covered the ground well by winter. June 1, jointing; some stalks 8 to 9 inches high; a few spots showed winter injury. July 15, grain about half filled, straw beginning to ripen. July 28, grain well filled and in the dough. August 14, grain injured by frost; some grain seemed matured, and the crop was cut for seed.

Another winter variety (not named): Seeded at the same time behaved about the same as Excelsior Winter. June 15, 18 inches high, heads about showing. July 28, grain well filled and in the dough. August 14, grain injured by frost. Some grain seemed matured, and the crop was cut for seed.

Spring rye, True Stock: Seeded in Tract D May 25. Coming up June 3. July 29, that on fertilized ground, 40 to 44 inches high, grain one-third filled; on unfertilized, 36 to 40 inches high, grain filling a day or two later. August 14, the grain was about filled when spoiled by frost.

Another plant of this same variety was seeded the same day, farther up the flat and near the winter wheat. It behaved about the same and yielded a good crop of hay. It was reasonably thick on the ground and stood from 3 to 4 feet high alongside of oats sown some days earlier, which stood but 12 to 16 inches high. The point of interest rests in the fact that the spring rye yielded fully two-thirds more forage than the oats under like conditions, the soil being the same.

BARLEY.

Champion: This variety was tried on three different tracts with the following results:

Tract A.—Seeded May 11. Coming up May 24. July 28, on the fertilized ground, 24 to 30 inches high, grain in the dough, straw golden color; on the unfertilized, 16 to 20 inches high, grain well filled, but not so far advanced by some days. August 14, grain hardening, frost injured it some. The crop was thrashed for seed (Pl. IV, fig. 3).

Tract B.—Seeded May 25. Coming up June 3. July 29, on fertilized ground, 24 to 33 inches high; on unfertilized, 12 to 18 inches high; grain one-third filled in both plats. Spoiled by frost.

Tract C.—Seeded May 23. Coming up May 31. July 28, on fertilized portion, 40 to 48 inches high; on unfertilized, 24 to 34 inches high; grain half filled in both plats, straw turning. August 14, grain spoiled by frost.

Hanna Two-Row (fall); This variety was tested on Tracts A and D.

Tract A.—Sown May 11. Coming up May 24 July 28, on the fertilized plat, grain well filled and nearly in the dough, straw turning; on the unfertilized, 16 to 18 inches high, grain about filled, straw not turning. August 14, all in the dough, but most advanced on the fertilized plat; damaged by frost.

Tract D, on lower bench.—Second-year ground; seeded May 13. Coming up May 25. July 28, 18 to 24 inches high, grain nearly filled. August 14, grain spoiled by frost.

Tract D, on the upper bench.—New ground, seeded broadcast May 23. Coming up June 1. July 28, 40 to 44 inches high, grain half filled. August 14, grain spoiled by frost; straw thick on the ground and matured sufficiently for good hay August 22.

Chevalier (beardless): This variety was tried on tracts A, B, and C.

Tract A.—Seeded May 11. Coming up May 24. July 28, on the fertilized part, 18 to 24 inches high, grain in the dough and straw semigolden; on the unfertilized, 10 to 14 inches high, grain and straw ripening a little later. Grain damaged by frosts and shriveled some.

Tract B.—Seeded May 25. Coming up June 3. July 29, on fertilized portion, 20 to 28 inches high, grain half filled; on unfertilized, 12 to 20 inches high, grain about the same. Grain spoiled by frost.

Tract C.—Seeded May 23. Coming up June 1. July 28, that on fertilized ground, 30 inches high, grain half filled; on unfertilized, 20 to 26 inches high, grain filled about the same. August 14, grain spoiled by frost.

Odessa: This variety was sown on three tracts with the following results:

Tract A.—Seeded May 11. Coming up May 24. July 28, on the fertilized portion, 24 to 28 inches high, grain well filled and in the dough, straw turning fast; on the unfertilized, 14 to 20 inches high, grain a little later. August 14, frost damaged the grain, causing it to shrivel some.

Tract B.—Seeded May 25. Coming up June 2. July 29, on the fertilized plat, 27 to 33 inches high, grain half filled; on the unfertilized, 18 to 27 inches high, grain one-third filled. August 14, spoiled by frost.

Tract C.—Seeded May 23. Coming up May 31. July 28, on fertilized ground, 36 inches high, grain nearly filled; on unfertilized, 30 to 35 inches high, grain the same. August 14, grain spoiled by frost.

Black Hulless: This variety was also tried on three different tracts.

Tract A.—Seeded May 12. Coming up May 24. July 28, fertilized, 20 to 25 inches high, grain well filled in the dough, straw nearly golden; unfertilized, 15 to 19 inches high, grain filled about three days later. Damaged by frost.

Tract B.—Seeded May 25. Coming up June 2. July 29, on fertilized ground, 30 to 32 inches high; on unfertilized, 18 to 24 inches high; grain in both plats about three-fourths filled. Spoiled by frost.

Tract C.—Seeded May 23. Coming up May 31. July 28, that on the fertilized portion was 30 to 36 inches high; on unfertilized, 20 to 30 inches high; grain about filled in both plats. August 14, the grain was damaged by frost. It was thrashed and sacked with that from tract A.

Sisolsk: This seed was sown for testing on three tracts.

Tract A.—Seeded May 12. June 1, none showing. July 1, a small percentage came and was 15 to 16 inches high. July 28, on fertilized ground, 25 to 32 inches high; on unfertilized not quite so high; grain one-fourth filled in both plats. Damaged by frost.

Tract D.—Seeded May 25. Coming up June 3. July 29, on the fertilized portion, 20 to 27 inches high, grain one-third filled; on the unfertilized, 14 to 20 inches high, grain filling a little later. August 14, grain was spoiled.

Tract C.—Seeded May 23. Coming up June 2. July 28, that on the fertilized area was 36 to 38 inches high, grain about half filled; that on unfertilized

ground, 20 to 30 inches high, grain filling a little later. Grain spoiled by frost.

Lapland: Sown on tract A, May 12. Coming up May 25. July 28, 25 to 30 inches high, grain well filled, and nearly in the dough; straw turning. August 14, almost ripe. The grain shriveled some.

Primus No. 10586: This was sown on two tracts with the following results:

Tract A.—Seeded May 12. Coming up May 25. July 28, on fertilized portion, 25 to 28 inches high, grain well filled and in the dough; on unfertilized, 20 to 22 inches high, grain filled a little later; straw ripening fast on both plats. August 14, grain damaged by frost.

Tract B.—Seeded May 25. Coming up June 3. July 29, on fertilized ground, 24 to 33 inches high, about all headed, grain one-fourth filled; on unfertilized, 18 to 24 inches high, grain filling a little later. August 14, grain spoiled by frost.

Manchuria: This variety was tested on all four tracts.

Tract A.—Seeded May 12. Coming up May 25. July 28, where fertilizer was applied it was 26 to 30 inches high, grain well filled and in the dough, straw turning yellow; on unfertilized portion, 14 to 18 inches high, grain filled a little later. Frost caused the grain to shrivel some.

Tract B.—Seeded May 25. Coming up June 3. July 29 on the fertilized area 26 to 32 inches high, grain about half filled; on the unfertilized, 12 to 18 inches high, grain filled a little later. Grain spoiled by frost.

Tract C.—Seeded May 23. Coming up June 1. July 28, where fertilized, 36 to 40 inches high, grain half filled; where unfertilized, 24 to 34 inches high, grain one-third filled. Spoiled by frost.

Tract D.—Seeded May 12 on new and second-year ground. Coming up May 24. July 28, 18 to 32 inches high, grain about filled, straw ripening fast. August 14, grain spoiled by frost.

Hanna, No. 9133: This variety was also sown on all four tracts.

Tract A.—Seeded May 12. Coming up May 24. July 28 where fertilized was 24 to 28 inches high, grain well filled and in the dough, straw nearly golden; where unfertilized, 16 to 18 inches high, grain filled a little later. Grain damaged by frost; shriveled some.

Tract B.—Seeded May 25. Coming up June 2. July 29 on the fertilized portion 20 to 32 inches high, grain about half filled; on the unfertilized, 18 to 25 inches high, grain one-third filled. Spoiled by frost.

Tract C.—Seeded May 25. Coming up June 1. July 28, where fertilized, 36 inches high; where unfertilized, 24 to 30 inches high; grain about one-half filled in both plats. Spoiled by frost.

Tract D.—Seeded May 11, broadcast on summer fallow and newly broken ground. Coming up May 25. July 28, 26 to 30 inches high, grain about half filled, heads good size, uniform; on burned spots, 32 to 40 inches high, grain filling a little earlier. August 14 grain spoiled by frost.

Manshury: This seed was sown on each of the four tracts.

Tract A.—Seeded May 12. Coming up May 26. July 28, where fertilized, 24 to 30 inches high, heads large, uniform, grain nearly filled; where unfertilized, 22 to 26 inches high, grain filling a little in advance. August 14 grain in the dough but damaged somewhat by frost.

Tract D.—Seeded May 25. Coming up June 3. July 29, on fertilized ground, 30 to 34 inches high, grain one-fourth filled; on unfertilized, 18 to 23 inches high, grain filling a day or two later. Spoiled by frost.

Tract C.—Seeded May 23. Coming up June 1. July 28 on the fertilized portion 36 to 41 inches high; on the unfertilized, 20 to 24 inches; grain one-fourth filled in both plats. Grain spoiled by frost.

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Tract D, lower bench.—Seeded May 9 and 10 on old and new ground. A part of this new ground was fertilized with guano at the rate of 500 to 600 pounds per acre, also a part with new stable manure, covering the ground liberally. The season proved too dry for the stable manure to show any effect. Coming up May 23. July 28 on old ground 20 to 36 inches, grain nearly filled; on guano plat averaged nearly 36 inches high, thick on the ground, grain filled and in the dough, straw nearly golden color; on burned spots 24 to 36 inches high, nearly as good as on guano plats and quite as far advanced; remainder very short and quite green. Somewhat damaged by the frost. The spots furthest advanced were thrashed for seed.

Trooper: Seed of this variety was sown on tracts A, B, and C.

Tract A.—Seeded May 12. Coming up May 25. July 28 on fertilized portion 25 to 28 inches high, grain well filled and nearly in the dough, straw turning; on the unfertilized, 14 to 20 inches high, grain filled a little later. Damaged by frost.

Tract B.—Seeded May 25. Coming up June 3. July 29 on fertilized area 24 to 32 inches high, grain one-third filled; on unfertilized, 12 to 18 inches high, grain filling a little later. Spoiled by frost.

Tract C.—Seeded May 23. Coming up May 31. July 28 on fertilized area 36 to 42 inches high, grain nearly half filled; on unfertilized, 24 to 32 inches high, grain filling about the same.

Royal: Sown on tract C May 23. Coming up June 1. July 28 on the fertilized plat 30 to 35 inches high; on the unfertilized, 24 to 30 inches high; grain two-thirds filled in both plats. Spoiled by frost.

Several of the barleys in tract A were almost ripe when the first killing frost came, August 14, which caused them to shrivel some. Champion was the furthest advanced, closely followed by Chevalier, Odessa, Black Hulless, Manchuria, Manshury, Hanna No. 9133, and Primus No. 10586. The several varieties in this tract were thrashed to ascertain what part, if any, of the seed will grow. The later sowings were unquestionably lost and were therefore cut for feed. The unfavorable weather from August 1 prevented both the wheats and barleys from hardening.

OATS.

Finnish Black (Rampart Experiment Station Seed): This variety was tested on each of the four tracts.

Tract A.—Seeded May 12. Coming up May 25. July 28 where fertilized 30 to 36 inches high, grain well filled, in the milk, straw turning yellow; where unfertilized, 18 to 22 inches high, grain filling a little later. August 14 grain hardening. Harvested for seed August 30, no visible injury from frost (Pl. V, fig. 1).

Tract B.—Seeded May 25. Coming up June 4. July 29 on fertilized ground 30 to 38 inches high, grain one-third filled; on unfertilized, 18 to 20 inches high, grain nearly half filled. August 14, frost damaged the crop, most of the grain shriveled.

Tract C.—Seeded May 23. Coming up June 2. July 28, on the fertilized plat, 40 to 42 inches high, grain about formed; on the unfertilized, 24 to 30 inches high, grain about the same. Frost of August 14 damaged the crop somewhat.

Tract D (Sitka Experiment Station seed).—Seeded on lower bench May 9, third-year ground. Coming up May 23. July 28, 20 to 30 inches high, grain well filled and nearly in the milk. August 14, frost damaged a small per centage. The crop was thrashed for seed.

FIG. 1.—FINNISH BLACK OATS.

FIG. 2.—BURT EXTRA EARLY OATS.

FIG. 3.—CUTTING GRAIN.

FIG. 4.—HAULING GRAIN HAY.

VIEWS AT THE COPPER CENTER STATION.

Two other field plats of these oats were seeded from home-grown seed saved from 1904 crop; only about 15 per cent grew, the seed having been exposed to severe frosts when ripening.

Banner: Seed of this variety was sown on tracts A, B, C, and D.

Tract A.—Seeded May 12. Coming up May 23. July 28, on the fertilized part, 20 to 24 inches high, grain filled and nearly in the milk; on the unfertilized, 12 to 15 inches, grain filled a little later. August 14, grain hardening; seems to have escaped the frost with little visible damage. Harvested for seed August 30.

Tract B.—Seeded May 25. Coming up June 3. July 29, on fertilized area, 30 to 34 inches high, grain just forming; on the unfertilized, 12 to 18 inches high, grain forming a little earlier. Frost of August 14 caused some of the grain to shrivel.

Tract D.—Seeded May 11, on third-year ground, also on summer fallow of the first seeding, lower bench. Coming up May 22. July 28, on old ground, 10 to 18 inches high, grain in the milk; on summer fallow, 24 to 30 inches high, grain half filled. This sowing covered a tract of new ground, and at this date, on burned spots, it was 40 to 41 inches high, with the grain half filled. August 14, frost spoiled the greater portion. It was much the furthest advanced on the driest and poorest soil, and there only a small percentage showed any injury. This portion of the tract was harvested and thrashed for seed.

Russian No. 2800: Sown on each of the four tracts.

Tract A.—Seeded May 12. Coming up May 25. July 28, where fertilized, 25 to 28 inches high; where unfertilized, 16 to 19 inches high; grain well filled and in the milk. Straw turning in both plats. August 14, grain hardening. The grain was thrashed for seed, as the frost did not seem to hurt it.

Tract B.—Seeded May 25. Coming up June 3. July 28, where fertilized, 30 to 36 inches high, headed, grain one-third filled; where unfertilized, 14 to 18 inches high, grain filling a day or two later. August 14, frost damaged the grain; much of it shriveled.

Tract C.—Seeded May 23. Coming up May 31. July 28, on the fertilized part, 35 to 40 inches high, grain well formed; on the unfertilized, 25 to 35 inches high, grain one-fourth filled. Damaged by frost; the straw cut for feed.

Tract D.—Seeded May 9. Coming up May 22. July 28, 16 to 32 inches, grain well filled and much of it in the milk; straw turning. August 21, cut for seed, a small percentage shriveled by frost August 14.

Tartar King: Sowings made on the four tracts.

Tract A.—Seeded May 12. Coming up May 25. July 28, on fertilized portion, 24 to 30 inches high, grain well filled and in the milk; on unfertilized, 15 inches high, grain filled a little later. August 14, grain hardening, frost did no visible harm. The crop was thrashed for seed.

Tract B.—Seeded May 25. Coming up June 4. July 29, where fertilized, 30 to 34 inches high; where unfertilized, 16 inches high; grain half filled in both plats. August 14, frost damaged the grain; later frosts spoiled the crop.

Tract D.—Seeded May 23. Coming up June 1. July 28, on fertilized ground, 33 to 36 inches high; on unfertilized, 24 inches high; both heading and grain forming. August 14, frost damaged the grain.

Sixty-Day: Sowings of this variety were made as follows:

Tract A.—Seeded May 12. Coming up May 25. July 28, on the fertilized portion, 28 to 33 inches high, grain well filled and in the milk; on unfertilized, 12 to 16 inches high, grain filled a little later. August 14, grain in the dough. Harvested August 30 for seed. The heavy frost did no visible damage.

Tract B.—Seeded May 25. Coming up June 4. July 29, on fertilized area, 30 to 33 inches high; on the unfertilized, 16 to 20 inches high; grain in both crops one-third filled. Frost of August 14 damaged the grain.

Tract C.—Seeded May 23. Coming up June 2. July 28, where fertilized, 34 to 38 inches high; where unfertilized, 20 to 30 inches high; both plats heading and grain just forming. August 22, grain in the dough and no visible damage from frost of August 14. Later frost damaged it some, and it was cut for feed.

Tract D, lower bench.—Seeded May 11, broadcast on new ground and summer fallow of the first seeding. Coming up May 24. July 28, on summer fallow, 26 to 33 inches high; on burned spots of the new ground, 34 to 38 inches high; grain in both plats nearly filled. August 21, grain about ripened, showing some damage from frost. The crop was harvested and thrashed. The new ground plat was not worth cutting.

Improved Ligowo: Sown on tract A May 12. Coming up May 25. July 28, where fertilized, 26 to 32 inches high; where unfertilized, 15 to 25 inches high; grain in both plats filled and in the milk; fertilized plat a little furthest advanced. August 14, grain in the dough; the grain did not show any damage from August frost. Harvested for seed August 30.

Duppaur: Sown on tract A, May 12; all fertilized. Coming up May 26. July 28, 30 to 36 inches high, grain two-thirds filled. August 14, grain in the milk. August frost spoiled the grain.

Burt Extra Early: The seed of this variety was sown on all four tracts.

Tract A.—Seeded May 12. Coming up May 25. July 28, on fertilized part, 30 to 33 inches high, grain well filled and in the milk; straw turning; on unfertilized, 20 to 24 inches high, grain filled a little later. August 14, grain hardening. Grain not visibly damaged by August frost. Crop thrashed for seed (Pl. V, fig. 2).

Tract B.—Seeded May 25. Coming up June 4. July 29, on fertilized portion, 24 to 28 inches high; on unfertilized, 12 to 18 inches high; grain in both plats three-fourths filled. August 14, heavy frosts damaged the grain and the crop was cut for feed.

Tract C.—Seeded May 23. Coming up June 2. July 28, on fertilized plat, 36 inches high, grain half filled; on unfertilized, 20 to 24 inches high, grain filling a little later. August 14, grain damaged by frosts. August 22, straw about ripe, cut for feed.

Tract D, lower bench.—Seeded May 10 on summer fallow of first seeding and third-year ground. Coming up May 23. July 28, on old ground, 18 to 20 inches high, grain nearly in the dough, straw about ripe enough for hay; on summer fallow, 24 to 33 inches, grain well filled and in the milk, straw turning. August 7, grain on the old ground ripe and cut for seed; summer fallow a little damaged by frosts August 14, part cut for hay and part allowed to ripen which was thrashed to test for seed. The summer fallow ground made a 50 per cent larger crop than the old ground.

Burt Extra Early was the first to ripen by several days and was thrashed before any frost. Finnish, Swedish, Select, Sixty-Day, Improved Ligowo, and Tartar King ripened about together. The early seedings of these varieties showed no injury from frost of August 14.

GRASSES (THIRD SEASON'S GROWTH).

The grasses all did poorly, the season being too dry.

Tall meadow fescue (*Festuca elatior*): June 1, poor stand and new growth backward. July 1, 20 inches high; heading. July 29, seed stalks about 36 inches high; scattering. September 1, no seed matured.

Timothy (*Phleum pratense*): May 5, new growth started. June 1, looking fair. July 1, 12 to 18 inches high; headed; suffering for moisture. July 15, blooming; growth uneven. July 29, bloom falling and seed well formed. Sep-

tember 1, seed ripened. Guano was scattered on a portion of the plat in the spring, but there was not sufficient rain to carry it into the soil until late in the season; this part is much greener at the close of the season.

Meadow foxtail (*Alopecurus pratensis*): June 1, stand very thin; growth well started and throwing out seed stalks. July 1, seed stalks scattering, 24 inches high. July 15, bloom falling; crop very light. July 29, seed nearly matured. August 15, seed was ripe.

Brome grass (*Bromus inermis*): May 15, up enough for good pasture. July 1, 12 to 18 inches high; some seed stalks 29 inches high and headed. July 15, stalks scattering, 24 to 30 inches high; good lower growth. July 29, stalks 30 inches tall; lower growth shorter than last year. September 1, seed did not ripen. Three acres were seeded to this variety May 12 of this year. It being very dry, the grass did not make much growth; however, the ground is quite well covered at the close of the season.

Redtop (*Agrostis vulgaris*): June 1, getting quite green; seed stalks showing. July 1, 12 to 18 inches high. July 15, good stand; heads opening. July 29, 24 inches high; seed formed. September 1, seed ripened.

Blue grass (*Poa pratensis*): May 15, showing green. June 1, seed stalks started, some heads showing. July 1, 20 to 24 inches high; very thin stand. July 28, seen nearly matured. August 14, seed ripened.

Orchard grass (*Dactylis glomerata*): June 1, getting green very slowly, partly winterkilled. July 1, little growth, very thin. July 29, good bunches thinly scattered over the ground; no seed stalks thrown out this season.

Tall meadow oat grass (*Avena elatior*): June 1, started late, a few stalks showing. July 1, 24 inches high; a few heads showing; looking poorly. July 15, 36 to 42 inches high; very thin on the ground; heads opening. July 29, seed formed. August 15, seed ripened.

Small plats of timothy, meadow fescue, orchard grass, brome grass, and hassock grass seeded in 1904 all made about the same growth as those of the 1903 seeding. Hassock grass of both seedings dead. The same sown this year did not come up. Red, white, and alsike clover of the 1903 and 1904 sowings were killed by the winter. The plats were reseeded this year, but made very little growth. Perennial rye grass was winterkilled and the plat was reseeded, but it also made very little start. *Holcus lanatus* was sown June 6, of this year. The soil kept so dry that the seed germinated very slowly and made a poor stand and little growth.

VEGETABLES.

PEAS.

Marblehead Mammoth: Planted May 12. Coming up May 23. July 15, vines thrifty, 24 inches high; supported with brush. July 23, blooming. July 29, 36 inches high; good setting of pods. August 14, just ready for first picking when heavy frost killed the whole vine.

Alaska: Seeded May 12. Coming up May 23. First picking July 20. The first setting ripened for seed. August 14, the frost killed the vines.

Prolific Early Market: Seeded May 12. Coming up May 22. July 15, full of bloom; some pods. First picking July 20. The first setting matured seed. August 14, frost killed the vines.

LETTUCE.

Early Curled Silicia, Philadelphia Butter, and Big Boston all sown in the open ground May 26. Were ready for the table July 1. The first named did the best; all made large plants.

SPINACH.

Long Standing: Coming up June 2. July 1, quite ready for the table. The plants became very large, and where not cut back the stalks were covered with seed, although it did not mature.

KALE.

Dwarf German: Only a few seeds grew. August 15, the few stalks were looking fine, 12 inches high and 18 inches across; very brittle.

RUTA-BAGA.

Purple Top Yellow Swede: Sown in boxes and open ground. Box plants set out June 8. Both seedings made excellent growth, showing large tops. Roots did not develop much till late in the summer. Those sown in the open were pulled September 2 to clear the field for pasture. The roots averaged of good size; the largest with top weighed 7 pounds. Those transplanted from boxes made a handsome crop; roots nearly all good size; largest weighed 7¼ pounds. The crop was pulled late in September. A few plants from the box seeding sent up seed stalks.

TURNIP.

White Strap-Leaf: Roots were large enough for table use July 15; tops large. This variety did well; still growing when pulled September 2 to open the pasture. The largest weighed 8 pounds. This variety suffered from a slight attack of the root maggot.

Purple Top White Globe: Large enough for use July 15. The crop was pulled September 2, for same reason as above. This variety did unusually well; roots averaged 5 to 6 pounds; largest with top weighed 11 pounds; sweet and tender.

RHUBARB.

Old plants from seed sown in 1903 made stalks of fair size for use June 15 and furnished three cuttings.

Winter Crimson Forcing: Seeds planted in the open garden June 3. July 1, up with fourth leaf. July 15, plants looking well and getting to be of good size. September 1, the stalks from these young plants would almost do for use; some seed stalks were sent up 12 inches high.

CUCUMBER.

Early Cluster: Seeded in the open May 26. July 1, plants looking fair, fourth leaf forming. July 15, plants thrifty; about vining. July 29, vines started; blooming and some cucumbers setting. August 14, some cucumbers 1 inch long when the vines were killed by frost.

BEANS.

Broad Windsor: Seed planted May 26. Coming up June 10. June 15, plants 1 inch high; healthy. July 1, average 9 inches high; looking well; branching out some. July 15, blooming. July 29, many pods showing, some filled enough for table use; still blooming. August 14, frost killed the vines. From August 1 until the vines were killed they were full of large pods well filled and excellent for green beans; only a few had been used, as we hoped that the seed would mature.

Horse Bean No. 7024: Seed planted May 26. Coming up June 9. June 15, 2 inches high. July 1, 9 to 12 inches high; not healthy looking. July 15, looking better; blooming. July 29, pods filled and about ready for use as green beans. The crop was light and all the beans had been saved, hoping to mature seed, but a heavy frost August 14 killed the vines.

CORN.

Early Crosby Sweet No. 10: Seed planted May 26, on lower bench near cottage. Coming up June 10. July 29, some stalks 16 inches high; many suckers. August 14, frost killed all the stalks. Another planting, on the upper bench, May 24. Coming up June 9. July 28, stalks 10 to 12 inches high. August 14, all killed by frost.

Pride of the North No. 8: Planted May 26, on lower bench. Coming up June 8. July 29, 15 inches high. August 14, all killed by heavy frost. Another planting, on the upper bench, was made May 24. Coming up June 7. July 28, many stalks strong and healthy; 12 inches high. August 14, all killed by frost.

Ne Plus Ultra No. 9: Planted May 25, on lower bench. Coming up June 12. July 29, 6 to 7 inches high; many suckers. August 14, killed by heavy frost. Another planting, on the upper bench, made May 24. June 15, none up. July 28, stalks 6 to 7 inches high. August 14, all killed by the frost.

POTATOES.

Extra Early Ohio: Planted May 26, on lower bench. First coming up June 9. July 1, tops getting good size and looking healthy. July 15, looking fine; making top fast; some bloom showing. July 29, tops of good size, very dark and of healthy color. August 14, vines killed by frost. September 5, 21 hills yielded 10 pounds, mostly small marketable potatoes, a few the size of goose eggs.

Garfield: Planted May 26, on lower bench. Coming up June 11. July 1, tops thrifty and getting good size. July 15, looking fine; making top fast; some blooms showing. July 29, vines strong and healthy. August 14, frost killed the vines. September 8, 40 hills yielded 22 pounds of potatoes, many of good marketable size.

Freeman: Planted May 26, on lower bench. First coming up June 1. July 1, making good tops and looking healthy. July 15, blooming some days. July 29, vines large and healthy. August 14, vines killed by frost. September 8, 57 hills yielded 36¼ pounds of potatoes. About half of the crop was of fair marketable size; many the size of hen's eggs.

The three varieties were also represented on the upper bench; the land was new and the yield was somewhat lighter. The vines were killed by frost August 14, as on the lower bench. All the potatoes grown here have been of the finest quality, but the yield so far has been light.

CABBAGE.

We did not try cabbage this year, but a number of small heads were grown in private gardens. The seed was planted in open ground as soon as soil could be prepared. The largest head seen was from G. S. Clevenger's garden, and weighed 2¾ pounds.

OTHER VEGETABLES.

Radishes, carrots, onions, beets, parsnips, cress, and parsley all did fairly well in the station and in the neighboring gardens.

NURSERY.

A small collection of nursery stock was sent through the mail from Sitka Station. Stock seemed to be in fair condition when received, and was set in the ground at once. Most of the rooted trees are alive, but they made little growth. Two gooseberry, three raspberry, and nine currant plants lived, but made little growth. Early in September the rabbits invaded the garden, and before they were detected the nursery trees had been eaten to the ground. It is evident that if anything is to be done in the line of horticulture, the trees will have to be protected from rabbits.

STRAWBERRIES.

Judge Holman presented the station with 12 plants, reserving the same number for his own garden, but none of the plants in either garden started.

FLOWER GARDEN.

The flower garden was small and received little attention; yet it was admired by many.

The pansy bed of plants 1 year old has supplied the neighborhood with blossoms throughout the entire summer. Crimson Flax, Candytuft, and Nemophila began blooming about July 25, continuing through the summer. Poppies and Larkspur both did well.

FALL SEEDING.

Several varieties of winter wheat and winter rye were sown on both the upper and lower benches July 27 and August 3. The several varieties came up quickly and made excellent growth, soon covering the ground. About the middle of September observations were made on the growth and it was found that the upper bench plats had been destroyed by rabbits since my last visit a week before. There were five plats covering one-fourth acre. The lower bench plats were also attacked, but it was discovered in time to make a temporary rabbit-proof fence around some small plats before they were seriously damaged. The rabbits were very numerous this fall, and the vegetation was killed by frost unusually early, which probably accounts for their invading our fields. Winter grains were grown the two previous years and the rabbits, though plentiful, did not damage our crops.

LIVE STOCK.

The station now has a team of two fine bay horses and one milch cow and a heifer calf. The horses were wintered at the station last winter principally on native hay, with a small daily allowance of grain hay (Pl. V, figs. 3 and 4). The team kept in good flesh until put to work February 15, freighting in the station supplies. From that time the animals were reduced some in flesh, having had no grain feed through the winter before being put to work.

The cow and calf were brought to the station August 20 of this year. The cow was then giving about 20 pounds of milk daily. The trip overland from Valdez was hard on the calf and the cow gave a very poor quality of milk for some days. The milk is now of good quality. A few days after the cow arrived the milk flow increased to about 28 pounds per day; but the early frosts spoiled the feed so much that we had to begin feeding all the stock early in September, and the milk flow has dropped back to 15 or 18 pounds per day. The total yield of milk from August 21 to September 20 (thirty days) was 644 pounds.

WORK AT THE RAMPART STATION.

WEATHER CONDITIONS FOR THE YEAR.

By residents of the interior the winter of 1904–5 was considered mild. Only once did the thermometer indicate 50° below zero, the average temperature for the winter months being, on an estimate, between 30° and 35° below zero. Thin ice began running in the river October 16, but it was not until October 20 that it seemed as though winter had begun. November 9 the ice blocked in the river, and in a few days it was frozen over solid and so remained until May 16 of this year. The maximum thickness of the ice was 4 feet.

The first snow to remain on the ground fell October 2, and by the end of that month there were 6½ inches. The total snowfall for the winter was about 18 inches, and half of this did not fall until early in February. This snowfall is considerably below normal, as there is often 4 feet in this locality.

Early in April conditions seemed to point toward an early spring. The days were bright and clear and the sun warm, but toward the middle of the month it got colder again and the snow stopped melting for a while. By May 5 the snow had disappeared from the plowed ground, and by May 10 it was all gone except in sheltered spots. By May 15 part of the ground broken up in the fall was dry enough to harrow, and on May 18 the first sowing of grain was made.

Taken as a whole the summer was the most unfavorable one from an agricultural standpoint since the station was established in 1900. It was characterized by cloudy, rainy, windy weather and cool nights. The rainfall, 6.7 inches from June 10 to September 15, inclusive, was above normal, but was not excessive, had it not been accompanied by so much cloudy weather and such cool nights during July and August, the best growing months. Once during July the thermometer dropped to 32° F., and several times to 33°, the average minimum daily for the month being 42.9° and the average maximum 68.6°. During the first week of August occurred the warmest weather of the summer, the highest temperature recorded being 96°. From June 10 to September 15, inclusive, a period of ninety-eight days, there were forty-two cloudy, thirty-four partly cloudy, and twenty-two clear days. The number of cloudy days is much above normal, according to common report.

The first frost came August 19, when the temperature fell to 29°. Between that time and the end of the month there were five more, but all were so light that only the tenderer things were injured. The first killing frost did not occur till September 13, the thermometer falling to 17°. During the last week of September there were several wet snowfalls, an unusual occurrence so early in the season, but most of it melted.

Persons who have been residents of Rampart since 1897 say this has been the most unfavorable summer since their arrival.

PROGRESS OF STATION WORK.

During the winter some 175 logs were cut for use in station buildings, and 35½ cords of wood, which were exchanged for team work in doing the spring seeding, etc. Other work during the winter and spring was done as the weather would permit.

From July 19 to August 10 the superintendent, Mr. F. E. Rader, accompanied by the special agent in charge, made a tour through the lower Tanana River Valley and helped survey a reservation near Fairbanks.

No help was hired prior to July 1, but since that time one man has been employed by the day. In addition to routine work and caring for the crops,

2½ acres have been added to the cleared land, making a total of 5½ acres available for crops next year. The weather permitting, all of the cleared land will be plowed this fall and put in readiness for seeding next spring.

No station buildings were erected this year with the exception of a small temporary stable. The lumber is on hand for the erection of a frame cottage next summer, the foundation for which will be prepared this fall. The lumber was obtained from the post sawmill at Fort Gibbon, 75 miles down the river from Rampart. By permission of the War Department, and through the courtesy of the commanding officer and the quartermaster at Fort Gibbon, 10,000 feet of logs were sawed into lumber at the post sawmill at the actual cost of the labor required. The lumber was delivered by the United States transport *Jeff C. Davis*, the station furnishing the necessary fuel for the trip.

Early in September a small consignment of freight was received from Seattle consisting of harness, wagon, drag, scraper, nails, etc.

FIELD CROPS.

The 2½ acres cleared last year was nearly all seeded to different varieties of spring grain and common oats for feed. Seeding was begun May 18 and continued at intervals, as the ground became dry enough to harrow, till June 6. As compared with last year, the first seeding was nearly two weeks later, the half acre in grain having been seeded in May 5.

Being practically all virgin soil without fertilizer of any kind, the stand of grain was very irregular on much of the land. On the spots where stumps had been burned the grain made a fine growth, but elsewhere the stand was thin and the straw short and spindling.

Following are the varieties sown and the notes on their growth:

BARLEY.

Manshury (Sitka-grown seed): Seed sown May 19. June 1, up. June 15, good stand, 3 inches high. July 15, best 24 inches high; occasional heads appearing. August 1, height 48 inches; fully headed and beginning to bloom; fine appearance. August 15, grain in medium dough. September 1, ripening. September 6, harvested; heads of good length and well filled.

Manshury (Rampart-grown seed): Sown May 19. June 1, up; looking well. June 15, good stand; 3 inches high. July 15, height 18 inches, best 27; partially headed. August 1, best 50 inches high; all headed and in bloom; best in the field. September 1, nearly ripe. September 6, harvested; fine well-filled heads. Last year this variety was ripe and harvested August 15, but the straw was neither so tall nor the heads so large. There seem to be very little difference between the growth of the Sitka and of the Rampart seed.

Minnesota, No. 105: Sown May 18. June 1, up. June 15, fair stand; 2½ inches high. July 15, height of best, 24 inches; occasional heads showing. August 1, height 42 inches; headed and in bloom; one end of the plat very good. August 1, filling well. September 1, nearly ripe. September 6, harvested; heads of good length.

Lapland (Sitka-grown seed): Sown May 18. June 1, coming up. June 15, fair stand; 2½ inches high. July 15, average height of best, 24 inches. August 7, height 42 inches; headed and blooming. August 15, filling. September 1, grain in hard dough and nearly ripe. September 15, harvested; heads fair.

Flying Dutchman: Seeded May 20. June 1, up. June 15, fine stand; 3 inches high. July 15, heading; height 21 inches. August 1, all headed, but not filling yet. August 15, fairly well filled. September 1, grain in hard dough. September 5, harvested; straw and heads rather short.

OATS.

Burt Extra Early: Seed sown May 19. June 1, coming up. June 15, fair stand, 3 inches high. July 15, height of best, 22 inches, one-half headed. August 1, in bloom; height of best, 36 inches. August 15, filling. September 12, ripe. Several short rows of this variety was sown in ground under cultivation for several years. It did better and ripened by September 5. The straw of this variety was rather small and short and the heads were heavy.

Finnish Black: Seed sown May 19. June 1, up. June 15, rather poor stand; 3 inches high. July 15, height of best, 21 inches. August 1, heading; height, 36 inches. August 15, just beginning to fill; height, 48 inches. September 1, grain in the dough, and occasional ripe head. September 12, partially ripe. This variety ripened fine heavy grain by September 1 last year.

Swedish Select: Seed sown May 18. June 1, up. June 15, fair stand; 2½ inches high. July 15, best 18 inches high. August 1, heading; 36 inches high. August 15, just past blooming. September 1, grain in the milk. Did not ripen.

SPRING WHEAT.

Saskatchewan Fife (Canadian seed): Sown May 19. June 1, coming up. June 15, good stand; 2½ inches high. July 15, height 15 inches; best 24; looks fairly good. August 1, height 32 inches; headed; looks well. August 15, in full bloom. September 1, filling slowly. Did not ripen.

Velvet Chaff Blue Stem (Canadian seed): Seed sown May 19. June 1, up. June 15, excellent stand; 3½ inches high. July 15, height 18 inches; looks well. August 1, all headed. August 15, in full bloom; looks fine. September 1, 48 inches; grain in soft dough. Partially ripened.

RYE.

Spring rye: Sown May 19. June 1 up in fine shape. June 15 extra fine stand; 4 inches high. July 5, beginning to head. July 15, height 34 inches; fully headed. August 1, height 50 inches; in bloom; looks fine. August 15, beginning to fill. September 1, grain in medium dough. September 13, partially ripe. This variety began to head forty-seven days from time of seeding, and gave promise of maturing in good season, but it filled so slowly that it did not fully ripen.

BUCKWHEAT.

Russian: Seed sown June 2. June 15, just coming up. July 1, very good stand; average height about 1½ inches. July 15, average height 4 inches; yellowish; doing quite well. August 1, height 18 inches; in bloom; yellow color has disappeared. August 15, forming grain. One of the very few things killed by frost August 19.

WINTER GRAIN.

A small plat of each of the following varieties of winter grain was seeded August 17, 1904. It came up in good shape, but was eaten off once by the rabbits before a fence was completed. It made a fairly good growth again before the cold weather set in. During the winter the plats were covered with snow varying in depth from 8 to 24 inches. As soon as the snow left the grain it began to grow, and it was soon apparent that the varieties covered the deepest stood the winter the best. It began to head in good time but was very slow in filling and ripening.

Amber Winter Rye: Seed sown August 17, 1904. June 1, 1905, fine stand; 6 inches high. July 1, fully headed; height 42 inches. July 15, height 50 inches;

in full bloom. August 1, height 54 inches; grain in the milk; good appearance. August 15, filling slowly. September 1, ripe; grain plump. September 5, harvested.

Excelsior Winter Rye: Sown same as above. June 1, badly winterkilled; one-fourth standing; height 6 inches. June 15, average height 18 inches, best 24; heading. July 15, in full bloom; 48 inches high. August 1, grain in the milk; filling slowly. August 15, grain in the dough. September 1, about ripe. September 5, harvested.

Giant French Winter Rye: Seeded same as above. June 1, height 4 inches; partially winterkilled; two-thirds of a stand. July 1, fully headed; average height 36 inches. July 15, in full bloom; 42 inches high. August 1, just through blooming. August 15, grain in soft dough. September 1, ripening slowly. September 5, harvested.

Kharkov Winter Wheat: Seeded same as above. June 1, almost all winterkilled; height 2 inches. July 1, height 12 inches. July 10, beginning to head. July 15, two-thirds headed; height 24 inches. August 1, mostly through blooming; height 32 inches. August 15, grain in the milk. September 1, grain in soft dough. Did not fully ripen. This variety did not have a fair chance.

A plat of each of the same varieties of winter grain was seeded again this year, August 18, on ground broken up a year ago. It has made a fairly good growth.

VEGETABLES.

With the exception of the potatoes, the vegetables were planted on ground under cultivation since 1900, but which has never been fertilized. The slow growth is attributed mostly to the unfavorable season.

POTATOES.

Burbank: This was Rampart seed grown by Capt. A. H. Mayo, who raises a good crop every year.

Early Rose: Seed obtained from Mr. Peter Lundien, Eagle, Alaska, who raises a good crop of potatoes every year.

These potatoes were planted on new ground without any fertilizing. They were slow in coming up and made a poor growth. The tubers were mostly small and the yield about equal to the seed planted. A few of the Early Rose were planted on old ground. They did much better, the yield being fivefold and the tubers of good size. All were dug September 13.

PEAS.

Prolific Early Market: Seed planted May 29. June 8, coming up; June 15, 1 inch high. July 1, height 6 inches; doing well. August 1, in bloom; injured by high winds. August 15, some pods fit for use. September 1, injured some by frost, but still blooming; fair yield of peas.

BEETS.

Crimson Globe and Eclipse: Seed planted May 29. June 12, coming up. July 1, good stand; 1 inch high. July 15, growing quite well; height 3 inches. August 1, doing well. September 8, beets pulled. They were small, many not being large enough for use.

ONIONS.

Extra Early Brown Spanish: Planted May 29. June 20, coming up. They grew very slowly all summer and attained a size of from one-half to three-fourths of an inch in diameter. Will make good sets for next year.

LETTUCE.

Big Boston and Philadelphia Butter: Seed sown thickly in the open ground May 29. June 10, up; grew very slowly and was not ready for use until July 20; then furnished all we could use till covered by snow.

RADISHES.

Scarlet Turnip: Planted in the open ground May 29, and at several intervals during the summer. They grew large enough for use in four or five weeks.

White Strasburg: Seed planted May 29. June 8, up. July 15, growing very rapidly. July 20, large enough for use.

RHUBARB.

Seeded June 1. About a dozen and a half seeds germinated and made a very satisfactory growth. They will be taken up and reset in the spring.

SPINACH.

Long Standing: Seeded June 1. By June 12 it was up, and ready for table use by July 15. Cut five or six times during the summer.

SALSIFY.

Seed planted June 1. June 20, up. July 1, quite good stand; 2 inches high. Grew very slowly, and by September 8 the roots were not yet large enough for use.

PARSNIPS.

Early Round: Planted June 1. June 23, up. Grew too slowly; did not get large enough for use.

CARROTS.

Scarlet Horn: Seed planted June 1. June 20, up. July 1, growing very slowly. Did not get large enough for use. Usually a sure crop.

TURNIP.

Large White Norfolk: Seed sown June 1. June 10, up. July 1, fair stand; 1½ inches high; leaves full of small holes caused by an insect. July 15, growing very rapidly; insects still working some. August 15, many roots large enough for use. Pulled September 8; did exceedingly well; very tender and sweet; a sure crop here.

RUTA-BAGA.

Champion: Seed sown June 1. June 10, up. July 1, fine stand; 1½ inches high. July 15, growing very rapidly; not attacked by insects. September 1, some roots of good size, but the majority rather small. Pulled September 8. Should have been planted earlier; usually a sure crop.

BRUSSELS SPROUTS.

Dwarf Improved: Seed sown in window boxes about May 5. Transplanted June 12. Grew very slowly; sprouts just beginning to form at the end of the growing season.

CABBAGE.

Early York, Early Jersey Wakefield, Surehead, and Early Winningstadt: Seed sown in window boxes about May 5. Transplanted June 12. Slow in starting and slow in growth; only Early Jersey Wakefield made small heads.

CAULIFLOWER.

Extra Early Paris: Seed sown in window boxes about May 5. Transplanted June 12. Grew very slowly. Just beginning to head at close of the season.

Early Snowball: Seed sown in hotbed May 10. Transplanted June 19. Grew quite well and produced several nice heads.

FLOWERS.

The flower garden was quite a success in spite of the unfavorable season. The following varieties were started in the window boxes during May and transplanted during June: Pansies, poppies, cornflower, and nasturtiums. The following were planted in the open ground: Sweet peas, gillia, and candytuft. They began blooming about July 20, and many of them continued to bloom profusely till the frost of September 13.

DISTRIBUTION OF SEED.

In addition to the garden seed sent directly from the Department to residents of the interior of Alaska, there is quite a demand among the miners and prospectors who have no fixed abode for such seed as radish, lettuce, turnip, and ruta-baga—things that grow quickly and require no particular care. The stores do not have seeds for sale, and these persons have to depend on the station for their supply. The several hundred packages distributed last winter and spring through the Rampart Station have been the source of considerable satisfaction to the miners and others.

WORK AT THE KENAI STATION.

WEATHER CONDITIONS.

The snow was gone by April 9, which was unusually early. The season advanced slowly, with frequent southwest winds, which held vegetation in check. After July 15 the weather was more favorable than the normal for that season of the year, and heavy showers alternated with sunshine. A heavy frost August 26 and 27 injured grain to a considerable extent.

May had twelve clear and six cloudy days; precipitation, 0.84 inch. June, sixteen clear, seven cloudy, with 0.84 inch precipitation. July, thirteen clear, twelve cloudy, with 1.06 inch precipitation. August, twelve clear, twelve cloudy days; precipitation, 6.26 inches; this is the greatest precipitation for any one month on record at this station. The number of clear days was normal, however, the increased precipitation being due to heavier showers than usual.

WORK ACCOMPLISHED.

Twenty-three acres of land are now under cultivation. The greater part of this was seeded to oats and barley to provide forage for the live stock, which now consist of 11 cows. (Pl. VI, fig. 1.) The remainder of the land was used for the cultivation of legumes, grasses, vegetables, bush fruits, and

FIG. 1.—STATION HERD, KENAI STATION.

FIG. 2.—CUTTING GRAIN AT KENAI STATION.

fruit trees. Milk and butter have been sold and a record kept of the sales. Records have also been kept of the milk yields, weather, and soil temperatures. No additional land clearing was attempted this season. All the time which could be spared from growing crops was used in improving the house and grounds. A road was made to the beach, and over this gravel was hauled to make walks from the house to the outbuildings. Old bricks were used as border for the walks. A number of spruce and birch trees were transplanted in the yard. The house has been recalked, lined with building paper, and all of the downstairs rooms have been repapered, which will make the house more comfortable than heretofore.

ADDITIONAL EQUIPMENT.

A mowing machine was added to the equipment August 2, and this will greatly lessen the time necessary to gather the hay. (Pl. VI, fig. 2.)

Six hens were purchased of a native of this place, and during August they laid 8 dozen eggs. These hens were fed on table scraps.

GRAIN.

FIELD OATS.

Field A.—Seeded May 22. June 15, 3 inches high; fair stand. August 1, 8 to 30 inches high; 50 per cent headed. August 15, 24 to 36 inches high. Grain was in the milk when injured by frost August 26 and 27.

Field B (first planting).—Seeded May 27. June 15, 2 inches high; fair stand. July 1, 4 inches high; good stand. August 1, 24 inches high; 25 per cent headed. August 15, 26 inches high; fully headed. September 1, 40 to 48 inches high; in the milk when injured by the frost.

Field B (second planting).—Seeded June 10. July 15, 4 inches high; fair stand. August 1, 12 inches high; no heads. August 15, 24 inches high; 50 per cent headed. September 1, 24 to 40 inches high.

Field C.—Seeded May 30 and 31. June 15, 1 inch high; uneven stand. July 1, average 4 inches high; good stand. August 1, 30 inches high; some heads showing. August 15, 36 to 40 inches high; 75 per cent headed. September 1, 48 to 60 inches high. Some of the grain was injured by frost.

BARLEY.

Hanna Two-Row: Seed sown May 26. June 15, 3 inches high; good stand. July 1, average 4 inches high. August 1, 36 inches high; 75 per cent headed. August 15, 36 inches high; fully headed. September 1, 40 inches high; some in milk and some in dough when injured by frost.

BUCKWHEAT.

Seed sown May 26. June 15, just coming up; good stand. July 1, 2 inches high; not thrifty. July 15, 2 to 10 inches high; some in bloom. August 1, 20 inches high; in full bloom; looking well. August 15, 30 inches high; seed formed. There was a small percentage of ripe seed when killed by frost August 26.

LEGUMES.

BEANS.

Horse Bean No. 2453: Seed planted May 4. June 15, 1 inch high; excellent stand. July 1, 4 inches high. July 15, 10 inches high. August 1, vines 24

inches long. August 15, vines 30 inches long; 50 per cent in bloom. September 1, vines 36 inches long; in full bloom; no seed formed.

Horse Bean No. 2455: Seeded May 4. June 15, 1 inch high; good stand. July 1, 4 inches high. July 15, 6 inches high. August 1, 18 inches high; a few blossoming. August 15, in full bloom; vines 24 inches long. September 1, vines 30 inches long; no seeds formed.

Horse Bean No. 7024: Seed planted May 26. June 15, only a few shoots showing. July 1, 2 to 6 inches high; poor stand. July 15, 12 inches high. August 1, 20 inches high; in bloom; beaten down by rain. August 15, pods formed; beans one-half the size of peas. Killed by frost August 26.

GRASSES.

Meadow foxtail (*Alopecurus pratensis*): Seed sown 1902. June 15, 24 inches high; fully headed. July 1, 30 inches high. Cut for hay July 1.

Timothy (*Phleum pratense*) of 1902: June 15, 6 inches high. July 1, poor, uneven growth; average 10 inches high. Cut for hay July 1.

Awnless brome grass (*Bromus inermis*), sowing of 1902: June 15, 12 inches high; July 1, 20 inches high. Cut for hay July 1.

Awnless brome grass (*Bromus inermis*), 1903: June 15, 12 to 16 inches high; good sod. July 1, 20 to 30 inches high; thrifty. July 15, 20 to 36 inches high. Cut for hay July 23.

Meadow foxtail (*Alopecurus pratensis*), 1903: June 15, 24 inches high; fully headed. July 1, 30 inches high. July 15, 20 to 36 inches high. Cut for hay July 22.

Timothy (*Phleum pratense*), 1903: June 15, 6 inches high. July 1, 12 to 18 inches high; headed. July 15, 18 to 24 inches high. Cut for hay July 22.

Tall fescue (*Festuca elatior*), 1903: June 15, 5 inches high. July 1, 12 to 18 inches high. July 15, 24 inches high; headed. Cut for hay July 22.

Redtop (*Agrostis vulgaris*), 1903: June 15, 6 inches high. July 1, 10 inches high. July 15, 18 to 24 inches high; heading. Cut for hay July 22.

Meadow fescue (*Festuca pratensis*), 1904: June 15, 6 inches high; good stand. July 1, 12 inches high; heading. July 15, 18 inches high. Cut for hay July 22.

Hassock grass (*Aira cæspitosa*), 1904: June 15, 4 inches high; poor stand. July 1, 5 inches high; heading. July 15, 18 inches high. Cut for hay July 22.

Blue grass (*Poa pratensis*), 1904: June 15, 3 inches high; poor stand. July 1, 12 to 18 inches high; heading. July 15, 18 inches high. Cut for hay July 22.

Perennial rye grass (*Lolium perenne*), 1904: Winterkilled.

Awnless brome grass (*Bromus inermis*), 1904: June 15, 8 inches high; thrifty. July 1, 18 inches high; excellent stand. July 15, 18 to 24 inches high. Cut for hay July 22.

Tall oat grass (*Avena elatior*), 1904: June 15, scant growth; 3 to 6 inches high. July 1, 12 inches high. July 15, 24 inches high; heading. Cut for hay July 22.

Tall fescue (*Festuca elatior*), 1904: June 15, 4 inches high; greater part winterkilled. July 1, 12 inches high. July 15, 30 inches high. Cut for hay July 22.

Orchard grass (*Dactylis glomerata*), 1904: June 15, 3 to 6 inches high. July 1, 4 to 12 inches high; very uneven. July 15, 12 inches high.

Tall fescue (*Festuca elatior*), 1905: Seed sown May 25. June 15, just coming up. July 1, 1 inch high; good stand. July 15, 2 inches high. August 1, 6 inches high. August 15, 12 inches high; a few heads showing. September 1, 18 inches high.

Timothy (*Phleum pratense*), 1905: Seed sown May 25. June 15, just coming up. July 1, well up; heavy stand. July 15, 3 inches high. August 1, 9 to 12 inches high. August 15, 12 to 18 inches high; a few heads. September 1, average 18 inches high.

Orchard grass (*Dactylis glomerata*), 1905: Seed sown May 26. July 1, just up; stand not good. July 15, 1 inch high. August 1, 5 inches high; heavy stand. August 15, 6 inches high. September 1, 12 inches high.

Italian rye grass (*Lolium italicum*), 1905: Seeded May 26. July 1, 1 inch high; good stand. July 15, 2 inches high. August 1, 4 inches high. August 15, 6 inches high. September 1, 10 inches high.

Mixed grasses: A mixture of all the grasses planted this season was sown June 13. July 1, just coming up. July 15, 2 inches high; good stand. August 1, 4 inches high. August 15, 6 inches high. September 1, 10 inches high.

Silver tussock grass (*Poa cæspitosa*): Seed sown in sandy bed; failed to germinate.

Native grasses: Of the native grasses sown, wild rye, wild barley, and one species popularly, but incorrectly, known as redtop, failed to grow. On August 15, the following notes were taken on native grasses: June grass, 12 inches high; bunch grass, 12 inches high; wheat grass, 3 inches high, poor looking; *Calamagrostis langsdorfii*, popularly known in this region as redtop, 3 to 12 inches high. The seeds of all these grasses were very slow in germinating, much more so than imported seed.

VEGETABLES.

The season was very favorable to the growth of vegetables until the frost of July 26. This year as well as last a large percentage of the cabbages and some of the radishes were killed by maggots. Wood ashes, which had been recommended, were applied but failed to check the ravages of the insect. This is the only native insect pest. The following is a detailed account of the growth of the vegetables:

KALE.

Improved Siberian: Sown in hotbed May 1. Transplanted to open ground June 7. A few of the plants died after being planted, but those that survived made a splendid growth and at present some of the plants measure 36 inches from tip to tip of the leaves.

LETTUCE.

Big Boston: Planted in hotbed May 1. Was not transplanted, and, since June 1, has furnished all we could possibly use on our table.

California Cream Butter: Planted in open ground June 8. Growth retarded during first month by dry weather, but was large enough for table use July 15.

Morse: Planted in open ground June 12. Large enough for table use July 20. All varieties of lettuce seem to do equally well.

CABBAGE.

Early Jersey Wakefield: Sown in hotbed May 1. A large percentage of the seed failed to germinate. Transplanted to open ground June 7. Grew splendidly until attacked by maggots, which to date have destroyed about 75 per cent of the plants.

RADISHES.

Early Scarlet Turnip: Sown in hotbed May 1. Edible June 1.

French Breakfast: The same as above.

30420—No. 169—06 M——5

Improved Chartier: Planted in open ground June 12. Ready for table use July 15. This is a long-rooted variety; tender, and of excellent flavor.

Long Scarlet Short-Top: Planted in open ground June 12. Ready for table use July 12.

White Icicle: Planted in open ground June 6. Ready for use July 20. This variety is pure white in color, long-rooted, excellent quality.

ONIONS.

Yellow Globe Danvers: Sown in hotbed May 1, and not transplanted. They have attained a diameter of about 1 inch.

CELERY.

Improved White Plume: Planted in the hotbed June 11. As the other plants were transplanted to open ground the celery was transplanted to their places in the hotbed. Boards were placed on either side of each row and the space around the plants was filled with earth. The plants are now 16 inches in height, have blanched nicely, and are crisp and delicious.

PARSLEY.

Planted in the hotbed May 11. Made a vigorous growth and is now 10 inches high.

PEAS.

Marblehead Mammoth: Sown June 24. A late variety making a rank, rapid growth. Large enough for table use at the end of August.

TURNIP.

Purpletop Strap-Leaf: Sown June 23. None have become extraordinary in size, but are very uniform and of excellent quality. The maggot that attacked the cabbage also attacked the turnips, but as the latter became larger the maggots disappeared.

RUTA-BAGA.

Thorburn Improved: Planted in open ground June 23. Were not attacked by maggots as turnips were. Have attained an average diameter of about 4 inches.

RHUBARB.

Became large enough for use during the first week in June and has not deteriorated in quality up to September 1. Close cutting keeps it from seeding or getting woody.

CARROT.

Scarlet Horn: Planted in open ground June 8. September 1, about 1½ inches in diameter.

BEETS.

Crimson Globe: Planted June 8. September 1, about 2 inches in diameter.

PARSNIPS.

Long Round: About 1 inch in diameter.

POTATOES.

In the spring no seed potatoes were on hand, so it was found necessary to plant from a supply brought from Seattle for table use. They proved to be a late variety, though they were of edible size by August 14. The plants were nipped by frost August 26 and 27, but continued to grow. The tubers are small in size, but a good quantity is found in each hill.

FLOWERS.

Poppies, sweet alyssum, sweet william, nasturtiums, nemophila, and sweet peas were planted June 25. The plants all grew well, and throughout the month of August furnished a profusion of bloom. Pansies sown in a box were in bloom September 1.

FRUITS.

Ten trees of each of the following varieties of apple (grafts) were planted, and the following number of each variety made more or less growth: Florence, 5; Whitney No. 2, 3; Iowa Beauty, 4; Okabena, 8; Tetabaski, 6; Charlinoff, 6; Day, 7; Whitney, 7; Early Strawberry, 8; Dutchess, 8; Yellow Transparent, 8; Brovina, 2; Sweet Russet, 6; Duchess, 7; Wealthy, 8; Illinois Siberian crab, 9.

Twelve red raspberry plants were set out, and 11 made a good growth. Five sweetbrier plants were set out, and all grew. Seven gooseberry plants were put out, but only one made any growth. Forty-three red currants were set out, and 28 have made a very good growth.

A number of native raspberry plants were set out in June, and without exception grew. Native red and black currants show a growth of 50 per cent of the plants set out. Seeds of the native strawberry and red and black currants have been gathered. Part of the seed will be sown here, and the remainder will be sent to the Sitka Station.

LIVE STOCK.

Nine head of cattle were wintered besides the three calves that were dropped during the winter months. Nothing but native feed was fed, and all the cattle were in excellent condition in the spring. The work oxen remained in good condition throughout the spring work. The increased number of animals will necessitate the sale of two steers in order to obtain sufficient stable room. These yearlings are in prime condition, and will weigh between 500 and 600 pounds each. On August 2 a 3-year-old cow and a calf were sold to Mr. O. H. Sleeper, of Sunrise, for $60. In view of the fact that the present cost of bringing cattle into Alaska is so great as to be almost prohibitive to individuals, it is believed that the development of animal industry in the country can be greatly facilitated by the station disposing of its surplus increase of stock to prospective stock raisers in the Territory at the cost of production.

A record of the milk yield has been kept as heretofore.

Milk yield of three cows.

Month.	First cow.		Second cow.		Third cow.	
	Monthly yield.	Average daily.	Monthly yield.	Average daily.	Monthly yield.	Average daily.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
November	587	24.05	.....	.....	.....	.....
December	705	24.07	.....	.....	.....	.....
January	669	21.57	.....	.....	.....	.....
February	406	14.5	.....	.....	.....	.....
March	356	11.5	619	19.96	204	22.63
April	298	9.93	577	19.26	575	19.16
May	362	10.7	599	19.32	584	18.83
June	392	13.06	701	23.36	718	23.93
July	369	10.9	646	20.83	685	22.1
August	295	9.77	586	18.77	602	19.41
Total yield	4,439	.....	3,728	.....	3,368	.....
Daily average	.....	14.6	.....	20.3	.....	19.41

The feed used for dairy cows has been native pasture in the summer and native hay in the winter. If the winter feed were supplemented with silage, the yield would undoubtedly be greatly increased. In the case of cow No. 1 we have the opportunity to note the effect of winter feed. The calf was dropped in early November, and for the first three months after calving the average daily yield amounted to 22.78 pounds. The marked decrease in yield during the month of February was probably due to a change of milkers which took place at that time. The improvement owing to modern methods of milking is shown in the yield of cows Nos. 2 and 3. As explained in my last report, these cows were formerly owned by the Russian priest at this place. The Russian method of milking consists in allowing the calf to begin and finish the operation, a procedure neither economical at the time nor conducive to a heavy milk yield in the long run. In the case of the two cows the increase in the average daily yield of this year over that of last year is very marked. It is believed that the average can be raised still higher by next year.

No addition to dairy equipment has been made to date, all appliances used being homemade. No accurate work can be done until the station is equipped with up-to-date dairy utensils.

The silo has not been given the attention it should receive at this station. In the fall of 1902 a so-called silo was built of logs and filled with peas. As was to be expected, most of the peas spoiled. The first essential of a silo is that it should be air-tight, and this is hardly possible with rough-hewn logs. A silo should be built and the practicability of feeding silage in this latitude be tested. Hay is not easily cured in the fall on account of frequent showers. This fact at once suggests the silo, and the immense amount of forage that can be raised per acre here would seem to make the building of one imperative.

REPORTS FROM SEED DISTRIBUTION.

The following reports from the seed distribution tell of results obtained under ordinary conditions in all parts of the Territory, and contain valuable information which will be especially serviceable to new settlers. As noted elsewhere, the season of 1905 was very favorable in the coast region, and the gardens here gave general satisfaction (Pl. VII, fig. 2). In parts of the interior, on the contrary, the season was very unfavorable. At Rampart and for 100 miles south of the sixty-fifth parallel, and generally along the Yukon, the spring

FIG. 1.—VEGETABLES AND MEAT AT SITKA.

FIG. 2.—VEGETABLE GARDEN ON LA TOUCHE ISLAND—A TYPICAL PROSPECTOR'S GARDEN.

was late, wet, and cold; in the Copper River Valley, on the other hand, the spring and early summer were too dry.

James Wallace, Metlakahtla, Alaska.—June was warmer and drier than I have ever seen it in this locality; hence it was very favorable for garden purposes. Strawberries ripened six weeks earlier than last year, and everything else from two to four weeks earlier. The soil here is decayed moss and does very well if sufficient fertilizer is applied. This season I used barnyard manure, fish offal, and seaweed, and found that fish produces the best results. On two-fifths of an acre I raised 110 bushels of potatoes of excellent quality, the best crop resulting from fish fertilizer. Ruta-bagas and yellow field turnips did well; some of the former weighed 5 pounds, and one of the latter weighed 9¾ pounds. Early cabbages do well, but the season is too short for maturing late varieties. This season they have been ruined by worms boring the heads. The trees and bushes which you sent me have all taken root and are doing well, but I hardly think the climate is favorable for fruit trees. There are several cherry trees in the village. Some seasons they bear a few cherries and some seasons none.

Cattle seem to thrive on the native grasses. We got a cow and a calf from Seattle in May, 1904. The cow was very thin when she arrived, but at once began to fatten, and has been in good condition ever since. They wintered on 1½ tons of hay and a little shorts, and were out every day last winter.

Dates of planting and first use, season of 1905.

	Sown or planted.	Ready for use.		Sown or planted.	Ready for use.
Cabbage, early, sown in hothouse.	Mar. 1	.....	Lettuce	May 5	July 4
Cabbage, early, transplanted.	May 5	July 30	Turnips, Early White	May 10	July 27
Peas, Telephone	May 13	July 22	Carrots	....do...	July 21
Peas, Prolific Market	Apr. 12	Aug. 1	Beets	....do...	July 24
Onion sets	Mar. 13	Apr. 1	Gooseberries	.....	June 11
Rhubarb	.....	Apr. 7	Strawberries	.....	June 13
Potatoes, Burbank	Apr. 12	July 24	Raspberries	.....	July 15
Cauliflower	May 5	July 22	Currants	.....	Aug. 1
			Celery	June 19	Aug. 25
			Radishes	May 10	June 12

J. Pittenger, Ketchikan, Alaska.—I received the fruit trees you sent last spring about May 1, and planted them at once. They made growths as follows: One red Astrachan, 2 feet; 1 Sylvan sweet, 2 feet; 2 Duchess, 1 foot each; 4 seedlings, 1 foot each; 2 Barovinka, both died; 2 Strawberry, both died. The raspberry, currants, and gooseberries all grew and are doing well. I am also growing strawberries and pieplant, and both are doing well. The strawberry plants came from Metlakahtla, and the pieplant is from roots sent up from Seattle. I tried raising pieplant from seed, but it was not satisfactory, as the seed does not come true to kind. I grew a great many plants, but none of them were of large variety, so I think it is best to send and get roots that are known to be of a large kind.

In the line of vegetables I have raised this year cabbages, radishes, lettuce, carrots, and turnips; they all did well. I also sowed onion seed, which made nice green onions, but none of them were large. I also raised some very nice ruta-bagas. I planted a patch of Late Rose potatoes about May 27, and in two weeks they were nicely up and in six weeks I had a photograph taken of them, which I inclose, showing that they grew very rapidly. Till early in September they did exceedingly well, the potatoes being of good size when the vines were killed by what one of my neighbors says was potato blight. The potatoes are now decaying very badly.

Nathan B. Whitfield, Ketchikan, Alaska.—I received several kinds of seeds from you last year for experimental growth, but failed to write my report of the results in time. This year I planted as nearly the same kinds as I could obtain from the stores here. They were planted during the first week in May in two different gardens. Garden No. 1, 20 by 40 feet; fertilized the year before with manure from the cow stable; no other stimulant. Garden No. 2, 20 by 20 feet, was of virgin soil not manured.

In garden No. 1, I planted beets, cabbages, collards, kale, lettuce, dwarf peas, radishes, spinach, parsley, and White and Red Strap-Leaf turnips. They all did well. The beets grew 4 inches in diameter. The cabbage—Early Wakefield—grew to be 8 inches in diameter with firm heads; the collard—large-leaved—became 18 inches tall; the kale was not so large; the lettuce was 12 inches across from tip to tip; the dwarf peas, 2 feet high, were loaded with pods; the radishes were from 1 to 2 inches in diameter; the spinach, 10 inches across from tip to tip; the parsley was 6 inches in diameter; and the turnips, from 4 to 6 inches in diameter, solid, and with rich green tops.

In garden No. 2 I planted lettuce, peas, potatoes, strawberries, sunflowers, and the trees you sent me. Five of the trees died, being in bad condition when received. Considering the little attention paid them owing to my necessary absence, the vegetables did well, making a growth beyond my expectation and equal to those in garden No. 1. The peas grew 5 inches high and were loaded with pods; the potatoes were from 1 to 3 inches in diameter; the strawberries produced a heavy green foliage and fruit; the sunflowers became 6 feet high, are now in bloom, and will probably mature seeds before severe frost; lettuce, radishes, and peas were planted, but never matured.

The trees were received May 2, and planted May 3. Some of them were in bad condition when received. Seven of them are living and range from 12 inches to 2½ feet high. The Red Astrachan apple, apparently dead when received, was not planted. Two Borovinka, a Sylvan Sweet, and 2 Early Strawberry apples are living and have a rich green foliage. The seedlings and young grafts died. Four currant bushes, 2 feet high, and 8 red raspberry bushes 2½ feet high, are growing nicely.

The mint I planted near a stream, and it is now a bunch 18 inches across and 2 feet high.

The experiment thus far I consider a success, and with proper attention this part of Alaska can produce as fine vegetables as any other part of the world in the same latitude.

Fred Patching, Fortmann Salmon Hatchery, Loring, Alaska.—Just a few lines to let you know how the garden grew at this place this season.

The apples and raspberries you sent me last spring grew as follows: One Red Astrachan apple grew 5 inches, and one (Sylvan Sweet) grew 6 inches; four raspberries grew shoots 3½ to 5 inches long; currants grew several sprouts about 2 feet long; three seedling apples grew 18 to 21 inches long; sand cherry made a growth of from 18 to 30 inches, and fruit formed, but did not mature; the root of mint made big growth.

Cabbage, Windsor beans, lettuce, radish, ruta-baga, rhubarb, horse-radish, celery, and onions from seed all did fine, in fact, could hardly be beaten.

All of the foregoing were raised on land that has been in cultivation two or three years, and was well fertilized with fish and stable manure. On a piece of ground that measured one-third acre we raised 78 sacks of potatoes, which seems to me to be a pretty good yield. This potato land was cleared in the spring of 1904, and some vegetables were raised on it. In the spring of 1905 it was planted to Burbank potatoes, with the above result. The soil was not fertilized, but it has the appearance of having been cultivated years ago.

Dorman Newman and I. Wheeler, Game Cove, Admiralty Island, Alaska.—We sowed in hotbed on April 1 cabbage of both early and late varieties. They were slow coming up, and were not fit to set out till about May 25. On that day there were set out about 300 plants, which were watered, as we had no rain whatever here in late May or June. They grew well, and out of the lot there were not more than 10 or 12 that did not head well. The Early Jersey Wakefield gave the best results, giving a nice hard head weighing from 4 pounds up. The Flat Dutch gave larger heads, but not as solid. The beans did not come up at all, just three or four stalks showing.

Onions came very slowly, but were good for green onions when they did come. We have saved some, and intend trying them as sets next year. Both kinds of beets did well, giving some nice roots 3 to 4 inches in diameter, but rodents of some kind spoiled quite a lot of them. Carrots did well and were of quite good size. Radishes did remarkably well, and from a small patch there were more than we could use. Lettuce also did well. Turnips of any kind do well here. We had four different kinds—ruta-bagas, Purple Top Strap-Leaf, Golden Yellow, and another kind. Turnips and cabbage seem to do well in this new ground. Potatoes grow well, but are not marketable. We got better results from the seed grown here last season than from fresh seed potatoes bought in Juneau, and we are going to try the same seed again next year and use seaweed as fertilizer. So far we have used no fertilizer of any kind, but will do so next year.

We received the reports you sent, and thank you very much for them, as information of any kind on gardening is acceptable.

Edward J. Lawrence, Tree Point Light Station, Alaska.—The seeds you sent me last spring were received in due time, and I gave most of them a good trial.

I am surprised at the good results obtained at gardening for this part of the country, especially with second-year ground which had been fertilized with fish, ashes, and henhouse manure.

Radishes, lettuce, and turnips grew quickly and were of good quality.

Onions (Extra Early Brown Spanish) planted May 1 were large enough for table use July 4, and by September 19 they were 2 inches in diameter.

Cauliflower (Extra Early Paris) did exceedingly well, and was, in fact, the best I ever ate.

Peas (Prolific Early Market) were planted May 10 and did well both in quantity and quality. The first mess was picked August 6. The vines grew too rank, some of them reaching over 6 feet in height.

Beets and carrots did well; beets reached 4 inches in diameter.

All the flower seed grew and bloomed well; sweet peas and candytuft were especially fine.

C. E. Peterson, keeper Sentinel Light-House Station, Alaska.—I herewith submit a report of my attempt at garden work with the different kinds of seeds which you sent me last fall, also of the several apple seedlings and berry bushes.

I sowed peas as early as April 25, as the weather was extremely fine and warm, but they did not show up till May 11. We picked the first peas for table use August 10; the vines were then standing 4 feet high. Out of one package of seed two families were supplied with about five meals from the crop.

I sowed ruta-bagas and turnips, white and purple-top. The white turnips did the best, and were as large as saucers. Some of the ruta-bagas weighed 4 pounds, were 13 inches long and 2½ inches through, and very sweet. Parsnips did not appear till late in September and were as small as one's little finger. Carrots (Scarlet Horn) did not show up much till September 1, but at the time

of this writing the average weight is about one-half pound. Radishes and lettuce grow wonderfully here considering that the ground is poor; in fact, all my vegetables did well considering the fact that they were put into ground that never had a blade of grass in it till I started the garden last spring. There was no fertilizer used except one small box of hen manure which I had saved up last winter.

The apple seedlings grew from a 5-inch stem to from 10 to 20 inches in height. The Red Astrachan made the largest growth; after it the Sylvan Sweet and four seedlings grew from 10 to 15 inches high. The two Duchess had only a few leaves. The two Borovinka did not do well, probably owing to the fact that there was not enough soil, as the soil on this island is in patches.

Flowers did remarkably well, sweet peas and nasturtiums especially. The berry plants you sent me are doing well, especially the currants, and the mint is 20 inches high.

I believe we could raise, with good fertilizer, almost anything on this rocky island. This being my first attempt, I shall no doubt do better next year. My assistant brought a few half-grown vegetables with him from Tree Point Light Station and planted them in the patch from which I had taken my turnips, and now he has cauliflower, ruta-bagas, beets, and kale. The beets from the seed you sent me are as large as my two fists and are still growing. Nothing but rotten stumps for soil, and a little rock weed covered the rocks. Whoever saw my garden this summer said I did well for a beginner with such soil. This winter we will make fertilizer with fish and rock weed or sea grass. Our potatoes were not plentiful, but some were quite large, and in taste the best I ever ate.

Gust Grundler, Douglas City, Alaska.—The following is a report of my experiments for the season:

Lettuce: Salamander; seed sown in hotbed April 1; transplanted May 15; grew very well, making large heads.

Kale: Dwarf Green Curled Scotch; seed sown in hotbed April 1; transplanted May 15; started slowly; maggots attacked the roots in July; I sprinkled sulphur around the roots, which relieved the plants of maggots, and they grew well after that; leaves about 16 inches long.

Cauliflower: Extra Early Snowball; seed sown April 1, in hotbed; transplanted May 15; started slowly; attacked by maggots the same as kale; some plants died, all the small roots being eaten off; heads 8 inches across the top.

Cabbage: Early Jersey Wakefield; seed sown April 1, in hotbed; transplanted May 15; had the same trouble with the maggots; heads 3 to 8 pounds.

Ruta-baga: Laing Improved; seeded April 1, in hotbed; transplanted June 1; roots attacked by maggots when about 1½ inches thick, eating all round the roots. After being relieved with sulphur the injured plants began to grow again, but the roots are small.

Beets: Detroit Dark Red; seed sown in hotbed April 1; germinated very slowly; transplanted June 15; after starting to grow, all the plants sent up seed stalks and did not form roots.

Radish: Glass; seed sown April 15; did not do well. The same variety sown June 10 started to grow, but maggots got the best of them, and only left the shells for me.

Turnips: White Dutch; seed sown June 10; came up fine, but are all wormy.

Onions: Extra Early Brown Spanish; seed sown June 10; roots became from one-fourth to three-fourths inches thick.

Carrots: Scarlet Horn; seed sown June 10; grew fine; good crop; no maggots on them.

Peas: Marblehead Mammoth; seed planted May 27; first picking September 10; a good bearer.

Beans: Early Red Valentine; seed planted June 1. I raised eight plants from one package of seed; the rest rotted in the ground. The plants died when 4 inches high. Everybody here who experimented with beans had the same result.

Parsley: Plain, or Single; seed sown April 1; grew fine; I have cut it three times, to dry for winter use.

Spinach: Curled Savoy; about one-fourth of the seed came up and went to seed stalks. I have had the same experience for three years.

Rhubarb: Rhubarb did fine this year; cut the last time October 1.

I have used some horse manure as fertilizer in my garden, and I blame that for producing all the maggots there. Sulphur seems to be a good remedy for them; I think it is unwise to use any horse manure as fertilizer in this section of the country. I shall put some lime in the garden; it may kill the eggs of the insects, if any are left; I shall also use some different fertilizer next year, but no fish fertilizer. A gentleman here bought some fish fertilizer in Juneau and put it in the garden just before planting; soon afterwards his garden was alive with maggots, which destroyed many plants.

The following is my experience with the apple trees you sent me: Every one of the seedlings grew about 4 inches; Early Harvest, 8 inches; Okabena, 6 inches; Borovinka grew below the grafts, new shoots about 6 inches high; the Early Strawberry died.

I gave three seedlings—one Early Strawberry, one Early Harvest, and one Okabena—to Mr. McDonald here; about two of the grafts died. Following your advice I sent to a nursery for two plum trees and four cherry trees. I selected 4-year-old trees; it is a little expensive, as the express charges on them cost me $3.40, but I shall have an early result. The plum trees have done well, making a new growth of about 10 inches. The cherry trees look healthy, but did not grow any.

The berry bushes you sent me took well to the ground. New canes on the raspberries grew 2 feet; currants the same, but they did not bear any fruit. I had ten currant, ten gooseberry, and twelve strawberry plants sent from Seattle. Five of the gooseberry and four of the currants died, the rest grew very little; the strawberries grew fine and bore a few berries; I raised about forty healthy plants from them.

I had eight rose bushes and some Japanese chrysanthemums from Seattle. I have two climbing roses; they started slowly, but grew fine after they had once got a start; the new shoots are 5 feet high, but there are no roses on them; one of the other six died; the rest started again and did well. The first rose opened July 25. Every plant had from three to five roses. There are some buds yet, but they will not open.

Of the chrysanthemums I have two growing, but there are no buds on them yet. On the dahlias the first flower opened August 15. I have a row of sweet peas along the south side of the house; they grew fine and are full of buds; in July about a dozen flowers opened, then the buds turned yellow, and I have not seen a flower on them since. The plants are still healthy looking and full of buds, but they will not open. I have seen them planted in other gardens and they were blooming all summer.

Dwarf nasturtium, mignonette, poppies (double and mixed), marigold, aster, amaranth, zinnia, and sweet alyssum did well, blooming since August 1. Daisies and pansies have been blooming all summer. Carnation, wallflower, and four o'clocks made good plants, but will only flower the second year. Double balsam are no good to raise in the garden; they are better indoors.

H. D. Clark, Skagway, Alaska.—I am glad to be able to report a better season for myself and other Skagway agriculturists than last year.

The report of my potato crop in the Daily Alaskan was not exaggerated. I planted 3½ acres of land to Early Ohio, White Ohio, Early Michigan, and Vermont Gold Coin potatoes. With the exception of the White Ohios our potato crop was a better one than I have ever seen either here or in the States. I have tried the White Ohio for three years in a small way, and I shall have nothing more to do with them. While the original potato which I used for seed was a very fine potato in every way, the potatoes raised from them have never been satisfactory either in quality or quantity. The Early or Red Ohio potato has been very satisfactory with us. I have raised it here for the past six seasons and have always been able to begin marketing in July; this season I began July 19. The Early Michigan, while not as early a potato as the Ohio, gives better satisfaction to the general market than the Early Ohio. I have raised it for four seasons and consider it one of the best varieties for this place. It is smooth skinned, white, mealy, and dry when cooked. Last winter I purchased 210 pounds of Alaska-grown Gold Coin potatoes. They planted a plat of ground measuring just 36¼ square rods. This fall the crop dug from that plat lacked 40 pounds of being 4 tons, which is a yield of 576 bushels to the acre. The Gold Coin is a late potato, but it fully matures in this climate. It is white, mealy, and very fine flavored. With us it is of good size, no overgrown ones, and few small ones. The large yield results from there being so many in a hill. Mr. Hogan, one of our neighbors, had on a small scale a greater experience with Gold Coin than I. From five hills in his little garden he raised 55 pounds. They were very large potatoes, and he pronounced them of poor quality. The largest hill that we weighed in our patch weighed 7¾ pounds. Our other varieties of potatoes have always been somewhat affected with blight, or stem rot, but we found the Gold Coin so far absolutely free from it. From the 3½ acres of different varieties of potatoes I raised a few more than 1,000 bushels.

We set out about 3½ acres of cabbages. The cabbage maggot damaged them to such an extent that we got very unsatisfactory returns. When I found the maggot was so bad we cleaned the soil away from the stem and applied air-slaked lime. While it checked them somewhat, it was not a satisfactory remedy. This same maggot ruined all our outdoor radishes and turnips.

I raised about a fourth of an acre of carrots, which were of fine quality, very large, and the yield was enormous.

I did not pay much attention to celery this year, but there was some very fine raised in Skagway this year. Our neighbor, Mr. Wildt, raised a patch of the finest celery I have ever seen.

We set out the nursery stock which we received from you last spring and gave it the best of care, but find that only a part of it has grown or is alive this fall. The live plants consist now of 2 apple, 2 cherry, 2 currant, and 1 raspberry. What the story will be next spring time will tell.

We have been experimenting with tame currants and red raspberries for the past few years and find that they do well. We set out 300 of the Cuthbert raspberries last August and expect to set out several other varieties next spring.

I can not close without speaking of the great crop of wild berries which grew on the hills and in the valley around Skagway this year. First in season came the currants, then the red raspberry, then blueberries (or huckleberries) and the high-bush cranberry. There were bushels of these berries picked, and bushels of them went to waste. The cranberries are largely used in making catsup,

which seems to be fully as popular as the tomato catsup, which it closely resembles.

Skagway's flower gardens grow more numerous and finer every year. There has been no snow or weather colder than 26° above zero as yet, and the pansies are still blossoming out of doors, though somewhat spoiled by the rains.

James Germansen, Kayak, Alaska.—I want to thank you for the seed you sent us at Middleton Island. You must excuse us for not reporting to you our success. We have had no mail facilities. We were bottled up on Middleton Island one year and twenty days, and all the news we received was from the whaler *Monteray*. We had no way but a small canoe to come to the mainland. We ran out of provisions, and starvation was staring us in the face. Finally the whalers gave us a little "grub" to tide us over until we could hear from the mainland. My partner and I have located a ranch apiece, but if we can't get any mail we are going to leave the island.

We have dumped tons of potatoes on the ocean beach just to make a little more mud. The same potatoes are selling at Catella for 3½ cents per pound. Middleton Island is the finest island in Alaska. We are past experimenting. We can raise anything they can raise in the Temperate Zone. Last summer we gathered 4 pounds of ruta-baga seed from volunteers we left in the garden all winter. Our cabbage has grown all winter in the garden. The coldest we have seen since we have been on the island was 20° above zero, the warmest 71° above. The deepest snow we have had was 14 inches. It lasted twenty days. Last winter we had no snow. The grass was green all winter. Middleton Island is the finest stock island in Alaska, but unfortunately from 45 to 60 miles from the nearest islands. But we have no harbor where we can leave a boat. It would be only 35 miles out of the regular route of the steamers. If we could get seven mails a year we could get along nicely. We have not been able to raise any carrot, beet, or onion seed. We want some Garnet Chillu potatoes, pure seed, for late potatoes. We could furnish this part of Alaska with potatoes if we had transportation.

Fred Liljegren, Little Naked Island, Prince William Sound.—Having the seeds and plants you so kindly sent me this spring, I will therefore let you know the results.

Apple grafts, apple seedlings, currants, and raspberries all took root nicely, except one Strawberry apple and one Charlimoff apple graft that died.

Stone Mason and Early Flat Dutch cabbage, set out May 19, made good solid heads, the first variety named being the largest. There being no frost yet I still keep them in the ground.

Curled Scotch kale grew to about 2 feet in height and was fine, dark, and tender.

Early Snowball cauliflower headed nicely. Peas, American Wonder and Pacific Early Market, planted May 13, did splendidly, the vines averaging 4 feet and the pods being large and well filled.

Half Long Stumprooted carrots did very well, some being 2½ inches in diameter.

I planted some parsnip seed, but they did not come up.

Ruta-bagas and beets proved a failure with me this year, as they mostly went to seed.

I tried several varieties of lettuce and radishes, and they all did very well. I also planted some potatoes May 10. The latter part of July we commenced to use them. I have just dug them, and we prefer them to those brought from Puget Sound, as they are more mealy.

I have sown a small quantity of barley each year for the last three years. Last year wind and rain laid it to the ground, but I cut the heads and dried them indoors and tried again this year. The grain ripened nicely.

Mrs. J. Garigan, Valdez, Alaska.—Most of the nursery stock you sent me is doing well. I have ten apple trees and one seedling which are 25 inches high. Of the six currants one is 32 inches high, and four of the raspberries are growing rapidly.

Beets (Detroit Dark Red) were a disappointment this year, as they went to seed very early; but carrots (Early Scarlet Horn) grew to medium size. Onions (Extra Early Brown Spanish) were fit for table use early in August. Broccoli (Mammoth White) was killed by late frosts, while cabbage (Early Jersey Wakefield) wilted a little, but pulled through. White turnips I do not plant, as they do not keep as well as the yellow turnip.

Sweet alyssum blooms early and more profusely than other annuals.

G. S. Clevenger, Copper Center, Alaska.—I sowed last spring 6 acres of oats, of which 4 acres was on a flat about 20 feet above the Copper River. These I put in with the drill and rolled the ground carefully afterwards. I cut about 2½ tons of good oats hay from this piece. The oats were nearly ripe when I cut them. I put in 2 acres on a high beach and broadcasted them and rolled them after sowing. These were not worth cutting. This was wholly new ground that had been burned over years ago, and the soil appeared to be good. Of the 4 acres first mentioned, 2 acres were new and the other 2 had been plowed once before. The plowing was all done in the spring.

I raised what might be termed a good garden. I had no potatoes to plant. I raised peas, onions, carrots, parsnips, ruta-bagas, lettuce, radishes, and cabbage. The growth was luxuriant. Some said it was the best garden they had ever seen in Alaska. My garden plat is 50 by 100 feet. I put ashes in the furrows before dropping the seeds, and it certainly did work well. I noticed on the field that wherever there had been a log pile burned there was a luxuriant growth of grain. I found the same thing was true on the experimental farm. I noted also the fact that the old land on United States experimental farm did not produce well. All this has forced the conviction upon me that the difficulty in raising crops here does not lie primarily in either the drought or frost, but in the fact that there is some element lacking in the soil. I did not water my garden, and the growth was excellent.

I have my cow and a 2-year-old heifer this winter. It is nearly two years since the cow was fresh, and we have our milk and make butter sufficient for the family. The cows will not be fresh until March. I think the smaller cows, that give very rich milk and are easily kept, are the cows for this country. It does not pay to raise beef here and will not for years. It can be driven in cheaper. Butter and milk is what is absolutely needed.

I brought three Wyandotte hens and a rooster in with me. They have done well. The hens have been great layers. I raised a half dozen chickens. We never had chickens do better. We can keep a dozen at little or no expense.

A. L. Hills, Seward, Alaska.—In compliance with your request I herewith hand you a report of my success with agricultural seeds furnished me by your Department.

I wish to note, in the first place, that the land on the 1st of January last was covered with heavy timber and moss. As soon as the frost was out of the ground I commenced grubbing the roots out of the ground. I planted two rows of peas 40 feet long, from which I gathered fully 2 bushels of peas in the pod.

I grew three crops of radishes on the same ground, and all were sound, crisp, sweet, and tender. Lettuce never tasted better than that grown here.

It lasted longer in its tender state than that which is grown in the States. Parsley was as fine as that raised in any country. Broccoli is as good as anyone could desire. Beets did not do well, but I think it was on account of the seeds being old. Carrots did well. Cabbage did as well as could have been expected; I was not able to plant them until very late. Cauliflower as fine as anyone need want was grown. Many cones or heads were 8 inches in diameter. Ruta-bagas grew very fine; roots 4 to 6 inches in diameter, tender and firm. Turnips never grew finer. In fact, for my own use I do not want turnips so large as some I have grown. Many of them are 8 to 10 inches in diameter, but they are solid and crisp. Onions were planted late, but I have many bulbs as large as half dollars. The celery was planted late, but did well. The parsnip seed did not germinate. I had the same experience with one paper of onions and one of beets.

In reference to the clover, I should say that this is the home of clover, either red or white. I see no reason why in the near future we should not be shipping forage instead of buying it, as we now do.

Potatoes do well, but I am of the opinion that they will mature better in the interior than they do on the coast.

Herman Stetler, Seward, Alaska.—Your favor January 18, 1905, received, also the seed you sent me, for which I thank you. The country in which I live is nearly all timbered. There is very little grass land, as it is a mountainous country and we have only creek bottoms to cultivate. It can not be made into dairy farms. It rains much more here than on the coast. There is some pasture over the foothills and mountain sides, but of the kind that grows in timber. There are no trails through the country and the river is too swift for use. My provisions cost me at least 10 cents per pound at my home. Produce shipped out would cost as much.

My garden did well this year. One ton of potatoes were produced from 800 plants. Carrots, Scarlet Horn variety, did well. Ruta-bagas, parsnips, and turnips did well; beets, Bassano variety, did well; kale, Scotch and Siberia varieties, did well and will winter with little care. Cabbage, Flat Dutch variety, did not do very well; it was too late. Onions, beans, and cucumbers are failures. I raised my own turnip, parsnip, and radish seeds this year. My peas did well.

F. Martin, Sunrise, Alaska.—The apple trees you so kindly sent me last spring have done fairly well. The grafted trees made but a few inches growth of new wood, but the seedlings grew very swiftly and made about 9 inches of growth. The raspberry and currant bushes did well, and I expect fruit from them next year.

The clover seed came up and made a good stand. This winter will prove whether it will winterkill or not.

A. Lawson, Sunrise, Alaska.—Many thanks for the packages of seed just received and also for the seedlings and berry bushes you sent me last spring. Every one of these bushes rooted nicely and they have made quite satisfactory growth.

The past summer has been very favorable for the various vegetables, and as a consequence I have a fine lot of potatoes, cabbage, turnips, beets, onions, carrots, parsnips, and winter radishes. I had an abundant crop of lettuce, radishes, spinach, parsley, cress, and flowers, and I took a good crop off my rhubarb plants. The potatoes in particular are solid and mealy; they grew quite large in size and the yield was as large as any previous year. This is the first season that my onions raised from seed have attained marketable size, but hereafter I feel reasonably certain of raising good onions in my garden.

Owing to sickness during the planting season and to the fact that I could not secure any help, I could only utilize a fraction of my cultivated ground. Had to abandon the grain crop, which otherwise would have been the most interesting part of my efforts.

Henry S. Tibbey, Coal Harbor, Unga Island, Alaska.—I again thank you for the various slips and cuttings you sent me in the spring. Allow me to report that of the apple slips four took root and made about 4 to 6 inches growth. Of the currant two took root, did well, and grew at least 2 feet. Of the raspberries four took root and reached about a foot above the ground. None of the rest made any sign and declined to be reported. The encouraging success met with in the case of the berries tempts me to ask for a further donation next spring.

Edwin E. Sholin, Jarvis City, Alaska.—In acknowledgment of the seed we received I shall first state that we did not receive it till the 1st of June, which was very late. Notwithstanding this we are having good results.

The radishes (Improved Chartier) are of the best quality and grow the largest of any I have ever seen. Lettuce (Hanson) is also fine. Turnips (Purple-Top White Globe and Purple-Top Strap-Leaf) did well. Ruta-baga (Thorburn Improved) and mustard (Ostrich Plume) are growing splendidly. Cabbage (Early Flat Dutch) and onions (Extra Early Brown Spanish) were planted late but they are doing well. The peas (Marblehead Mammoth) are growing splendidly and beginning to bud. The beets (Dirigo) grew very poorly, and the beans (Improved Golden Wax) came up, but would not grow, and soon died.

The flower seeds came too late to be planted this season. They will be planted this fall or next spring.

I will also mention that potatoes grow splendidly here, and that I believe that carrots, parsnips, and other vegetables will do well in this locality.

A. W. Newhall, Unalaska, Alaska.—The seeds sent out by the Department of Agriculture were received and planted in due time. Owing to the warm summer and also to the moderate rainfall the garden has done well—better than any previous year. The kale, lettuce, and radishes grew rapidly. The turnip crop was a good one, some of the turnips measuring 24½ inches in circumference. Rhubarb also does well in this place. This season I have also planted a few strawberry plants.

Mrs. T. D. Elliott, Council City, Alaska.—I put out a garden this spring on June 4, but did not have very good success. I do not know whether it was the fault of the seeds or the cold weather. The lettuce was the only vegetable that was fit to use. The beets, radishes, and turnips went right to seed. There was not a garden in Council that amounted to much. I shall try again next spring and hope to have better success.

S. A. Shea, Council City, Alaska.—I send you my report on vegetables growing here. On June 6 radishes, turnips, kale, spinach, onions, cabbage, ruta-bagas, mustard, potatoes, peas, beets, parsnips, and carrots were all up doing well. June 21 we had a flood here. The water came over my vegetables and ruined all. I planted over again and have good turnips and cabbage. Lettuce, onions, beets, and ruta-bagas are small. Next spring I will try again.

I have sent to New York for seed. Thanks for the seed you sent me. We have had a cold summer, ice in August. To-day ice is 1 inch thick. I have 2 acres of land in cultivation.

Mrs. A. V. Dedrick, Council City, Alaska.—Will you please send as many seeds, both flower and vegetable, as possible? I have tried some of the Government seed for the last three years with very good results. This season has been

very wet and cold, not more than six sunny days in all. But I have small cabbages, turnips, kale, spinach, mustard, radishes, lettuce, parsley, and beets. Beets and onions are both very small. Parsnips and carrots were a failure, but everything else is doing well. Peas and beans were too late in coming to plant this year.

As for my flowers, I have a bank of double poppies of all colors 4 feet wide and 11 feet long growing from one package of seed. Nasturtiums did well, growing 4 feet high; plenty of blossoms came out, but an early frost killed them. Sweet peas are budded, but I am afraid they will not bloom. All the flowers were grown in new ground, a mixture of loam and beach gravel with very little manure.

I tried two kinds of radishes. The Early French Breakfast was the best, maturing in twenty-nine days in a light sandy soil. I tried one bed with manure, but they ran to tops. The long radish did not do so well; it was six weeks before it was ready for the table and then it was tough. Turnips, Purple-Top Strap-Leaf, has been the best. I burnt over the chip yard in the spring, turned the ground, put in a little manure, and sowed the seeds broadcast. We thinned them well, using the tops for greens, and they have done much better than those in the garden. I asked for a quantity of seeds, as we have about fifty natives here during the summer. They are all very much interested in the garden. I gave seeds to three of the younger men, and they all have fair gardens. Next year, with the experience of this, I think they will do well enough to have something to sell. They are an industrious, good, capable people, and I think once started would do very well with gardens here, as there is a demand for all kinds of garden stuff and high prices paid for it.

One boy brought me a nasturtium blossom as large as the top of a tumbler, and having eight petals instead of five. I had told him about using the offal of the squirrels and the bones—of which they had a good deal after the spring catch—as fertilizer; so when he planted his flower seed he put two seeds inside of a dead squirrel and planted it. They were longer in coming up than the others, but I think all the blossoms are double, like the one he brought.

I think it would be very easy to raise strawberries, as there is plenty of good sandy soil. Last year I sent out for some plants, but they came in after the boats had stopped running between Golovin and Nome. They were a long time reaching me, but we packed them in sand and stored them in the cellar till spring. I saved only a few plants, but they have done well, although it is too cold for the berries to ripen. The native red currant pays well for transplanting; it yields double the next year.

I also have good results from bulbs, and we have plenty of flowers in the house all winter. Pansies do the best of anything. I have some plants that are 3 years old, and one has borne over 300 blossoms this year. I cut them down every fall, put them in the cellar till April, and set them out in the garden as soon as it is warm enough. I hope you will be able to let me have plenty of seeds, for home use as well as for distribution, as early as possible.

Vegetables grown at Council City, Alaska, during the summer of 1903 are shown in Plate VIII.

Correspondent, Holy Cross Mission, Alaska.—Last year I told you that our crops were not as satisfactory as usual, and this year I can say so with greater reason, owing to our very short and cold season.

We had very cold weather and rain most of the time till the middle of July; then a few warm days and sunshine, followed by dark, cold weather again. Hard frost in the beginning of September put an end to all growth; still we left our crops out till September 13. We were expecting a few days of sun-

shine to dry our potatoes before bringing them in, but finally had to take them out the best we could; the ground being already frozen pretty hard on the top, it was not safe to wait longer.

What I can not understand is that nearly everything grew to seed this year—turnips, ruta-bagas, beets, celery, onions, etc. In past years only the beets grew to seed. The turnip field was a mass of yellow flowers. I should be very thankful to know the cause of vegetables going to seed before their time.

I raised some parsnips and onions under glass, and transplanted to open ground in June. These did fairly well. I succeeded better with celery this year, as it had an early start indoors in the beginning of April. Most of the celery measured 3 feet in length and 7 inches in circumference at its thickest, near the root. What grew to seed measured 4 feet. I tried tomatoes again, but after transplanting they did not even produce blossoms. I have fresh seed of an early variety, and I mean to try again. I may hit sometime on a warm season and astonish everybody. We had a few ripe strawberries in the beginning of August, but they had been in blossom from the 1st of June and could not ripen for want of sunshine. The carrots were poorer than usual. As I mentioned in my last letter, our cucumber and melons melted away by some kind of invisible frost the first week of July. Different varieties of oats, barley, wheat, etc., were tried.

I am happy to acknowledge the receipt of a good supply for next year's trial. I distributed a good deal of it among the Indians, especially turnip, radish, and onion seed.

In the beginning of July I received by mail a few pounds of shallots, and I planted them immediately under glass, to try and have them mature before autumn. They grew rapidly to a good size. But I am not sure that they are ripe enough to keep over winter.

John W. Chapman, Anvik, Alaska.—It gives me pleasure to acknowledge receipt of a shipment of seeds from your office, by mail, for various native and white residents of Anvik. These have been delivered and have been gladly received.

The season has been a rather cold one, and all crops are already housed. Potatoes are of excellent quality, and average rather larger in size than last year. The carrots and beets are also better than last year. Rhubarb was perfectly successful. Onions, overlooked and left in the ground last year, renewed their growth in the spring, but did not attain to any great size. Onions from seed grew to about three-fourths of an inch in diameter. The flowers that gave the most pleasure were stocks, clarkias, nemophilas, poppies, and sweet william. The last did not mature last year, but plants left in the ground proved hardy and grew into fine flowering plants in August of this year. Pansies should have been included also in this list. They survived the winter and did exceedingly well, some of the blooms measuring 3 inches in diameter. Chinese pinks wintered, but failed to blossom, although they were full of buds and needed but a few more days to reach perfection. In a better location they would doubtless have proven successful.

A cow and a calf were imported for the mission, reaching us the last week in July. Ten tons of hay were cut along the margin of the Anvik River and stored for the winter at a cost of less than $100. The expense should be much less next year, as the ground had not been prepared for cutting the hay. The experiment of keeping a cow must be regarded so far as successful, for in the month and a half that we have had her she has given us more than her own weight in milk—on the native forage.

W. Wenrich, Chena, Alaska.—Carrots planted May 18 in soil cultivated for

VEGETABLES GROWN AT COUNCIL CITY BY MRS. C. B. PHILLIPS.

two years and manured both years were ready for use the last of August; were pulled September 20, being from 2½ to 3½ inches in diameter and very nice. I transplanted some, but they did not do very well.

Onions: Seed sown May 15. Grew slowly and were as big as marbles by August 15, but did not grow much after that time. The soil was well manured, Those planted May 24 did better than the ones of May 15.

Cabbage: Seed put in May 15; transplanted June 12; ready for use from September 1 to 15; pulled September 21. About three-fourths of it headed up, the heads averaging about 2½ pounds. Cabbage planted April 22 in boxes and set out May 31 developed by August 20 to 30. Mostly all headed well, weighing 2 and 3 pounds. The soil was previously cultivated and was well manured the first year with horse manure and this spring with salmon offal. Most of the cabbage set out June 23 had small solid heads which averaged about 1½ pounds. Cabbage planted June 9 was too late to mature.

Carrots: Planted May 31, but were sowed too deep. They were about 1½ inches through, when dug, September 2.

Spinach: Planted May 17; ready for use in July; grew to a height of about 2½ feet and was very nice.

Beets: Seed sown May 15; transplanted June 17; became as large as small teacups, but they were woody, wormy, and scarcely fit to use. The ground in which they were planted was second-year ground and well manured. Beets planted May 5 replanted June 22 in the same soil were not as good. Those planted in new ground which had been well burned were small, but nicer than those in the richer soil.

Sweet peas: Planted May 16; bloomed beautifully in later August and September. I never saw such deep, vivid coloring in flowers as in these.

Ruta-bagas: Planted in rich soil cultivated two years May 17; grew to be 4 or 5 inches in diameter, but were inclined to be woody. Some which were planted in new-burned soil did not grow quite so large, but the roots were of better quality. These were replanted 8 inches apart. Ruta-bagas were sown broadcast June 9 in new-burned soil. Some grew as large as teacups, but most of them were a little too late, being planted too deeply. From experiments this year it seems that all roots did better in the new-burned soil and planted very shallow. Also that the ground spaded 6 to 8 inches deep did not produce as quickly by one week as ground barely turned over. The soil should be well pressed over the seeds.

Celery: Planted May 27 in a big box of rich soil; came up very thin and was left standing in the box. It had grown to about 2 feet high by fall.

Brussels sprouts: Planted May 22 in boxes; replanted June 4; grew about 1 foot high. We did not use them at all.

Parsnips: Planted May 22, and grew slowly. They were not over an inch thick September 1, and an inch and a half September 22. Those planted June 9, in new soil too deep, did not grow large enough to gather.

Turnips: Planted June 14, in new-burned soil. The ground was barely turned, the seeds planted shallow, and did well. They were 6 to 8 inches thick. These were planted at the right time for the fall crop; they would have done well for summer market.

Cauliflower: Planted April 22 in boxes in the house; replanted June 17; August 10, was heading, and well developed by August 20; the heads were 10 inches across. When not pulled the heads shot up into branches and spoiled.

Onion: Seed planted June 6, but was too late. Beans were planted June 6, but frosted August 14. Sweet corn planted June 9, grew 9 inches, and was frosted August 15.

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Oats: Sown June 19 and headed out August 12, about 2½ feet high. It was planted on good soil and made good feed on October 1. A few seeds scattered around on the snow in the spring turned yellow before frost and the seed fell to the ground. We shall see if any of it turns up volunteer next spring.

Timothy: Seed scattered around in the fall of 1904 came up well and grew 2½ feet high this year, but last winter was very mild.

Millet: Seed sown July 5; grew 6 inches high, but was killed by frost August 22.

Potatoes: Planted June 23; 15 pounds of seed produced 75 pounds of very small potatoes. I shall keep part of this seed and try it in the spring.

I replanted wild raspberries June 26; July 27 I filled in and planted more—about 125 plants in all—and have cultivated them several times. I found wild berries ripe July 26, and they lasted till September 1. They grow in abundance on the hillsides, where the sun strikes them, and should respond to cultivation. I shall manure these next winter and cultivate them next summer.

I also took up and replanted about 50 plants of red and black currants; they are found wild along the small ravines and creeks. I am afraid the place I planted them in is too exposed, though I covered their roots well with grass mulch. Everything planted in the open field before May 10 did not do as well as a few days later.

September 30 I buried in holes 2 feet deep or more and covered 1 foot deep, heaping well on top, so as to drain in the spring, a few pounds of each of the following: Carrots, turnips, cabbage, beets, home-grown carrots, onions, potatoes, and ruta-bagas. I shall see how they winter and report it.

For two years I have had volunteer pansies.

Lettuce did very well, some heading up almost like cabbage, at least a foot across.

Radishes did well, but, like the other roots, did better in the new soil, which had a coat of 2 inches or more of ashes of burnt vegetation. In the rich soil the radishes were wormy, but not in the new soil. They grew 2 to 3 inches thick. I saved some radish seed pods, which I think are ripe enough to grow in the spring.

I brought in a few strawberry plants from Dawson, but they did not live. They have to be taken in in the fall in Dawson or most of them winterkill.

Rhubarb did well on a ranch above me this year, and I shall plant some next year.

Parsley grew very nicely all summer.

My soil was not flooded when Fairbanks and Chena were overflowed this season. It is high and dry, and I believe excellent potato soil. I expect to put in quite a piece next year.

This year was very rainy after July 1. Before that time we carried water for cabbage and cauliflower. Next year I shall try to irrigate with a water wheel, as the Tanana River runs past my place.

REPORTS FOR 1904.

The following letters, which refer to the season of 1904, were received too late for publication in the report for that year. They are printed here because many of them are of much value in that they give the reader a good insight in the prevailing conditions. The season of 1904 was backward and unfavorable in the coast region, but it was, on the contrary, quite favorable in the interior. The re-

ports for 1905 are the reverse. The season was favorable in the coast region, while the results in the interior were not satisfactory, owing to more than the average amount of cold and wet weather.

Special attention is called to the following valuable report from Judge Howard, of Coldfoot. That vegetable growing can be made a success 60 miles north of the Arctic Circle is a fact which will interest all who are friends of Alaska. The further fact that potatoes have a market value of 30 cents per pound will suggest the possibility that a market garden might pay better than a fairly good gold mine. The price also gives a hint of the economic conditions which exist, and, inferentially, the need of roads and transportation facilities.

Frank E. Howard, United States commissioner, Coldfoot, Alaska.—In reply to your request that I report results of my efforts at gardening in this section of Alaska during 1904, I submit the following:

Coldfoot is situated near the head of the Middle Fork of the Koyukuk River, 67° 20′ north and 150° 20′ west, about 60 miles above the Arctic Circle.

In the spring several small gardens were planted in Coldfoot and on the adjacent creeks from seed sent me from your Department. But I shall report the results from my garden only and the prolific crop of the one that was planted by our deputy marshal, J. H. Johnson.

The summer of 1904 was the third planting of my patch No. 1. The soil has proven not as prolific as my other patches, owing to its being clayey and retaining the cold. It is slow to thaw in the spring, and when I spade it up about May 1 the shovel touches frozen ground at a depth of from 6 to 8 inches. When I first cleared this patch it was covered with a foot of moss, and my experience leads me to the conclusion that moss-covered ground, for some years at least, is decidedly unfavorable to garden growths. At least ground that was not covered with moss produced far better results. For three seasons patch No. 1 has produced a fair crop of turnips, with an increase of worms each year that did some damage. The turnips planted were Purple-Top Strap-Leaf, and White Milan. Yellow Goldenball turnips did fairly well, and I think in more favorable ground would produce excellent results. They are the best turnips for winter storage. Ruta-bagas were a failure. Lettuce (Boston Market) did fairly well. Radishes were destroyed by the worms. On May 12 I transplanted cabbages (Early York) when the plants were 2 to 3 inches high. As a protection from freezing nights, occurring at intervals up to June 1, I covered the plants with white-glass beer bottles, first cutting off the bottoms and necks. In such jackets the plants flourished well, and by June 10 had grown to such size as to fill the bottles, when I uncovered them. Most of these plants headed to about the size of a cocoanut, many of them being quite solid. I harvested my crop the first week in September, and have cabbages for all winter and a keg of fine sauerkraut.

My experience during two seasons with patch No. 1 led me to believe that garden stuff would grow here with some degree of luxuriance in more favorable ground. I therefore selected a patch almost free from the usual heavy covering of moss, cleared it in the first week in May, spaded it the third week, and planted lettuce, radishes, peas, beets, ruta-bagas, and turnips the last week. About June 1 I transplanted a bed of kale when plants were 2 inches high.

Lettuce (Boston Market) I planted in two remote beds. One bed was a complete failure, but the other one produced abundantly in large and exceedingly fine heads, tender and sweet. Such a contrast in the growths from the same

seed in practically the same soil I can not account for. Radishes (a globe-shaped variety) could not be excelled, as also the White Milan turnips. Beets (Crimson Globe) grew to goose-egg size, tender and sweet. The tops were large enough to make excellent greens. I believe that with careful attention a reasonably good crop could be raised. Peas grew from 2 to 3 feet high, blossomed and podded abundantly, but were killed by frost before they reached edible size.

Kale grew from 2 to 2½ feet high. When the ground began to freeze I pulled the plants and stored them for winter greens. They keep well as long as they remain frozen.

I had four very small potatoes, which I cut in half and planted in eight hills. They sprouted quickly, and produced healthy vines that blossomed and yielded a crop that was a pleasant surprise. The one-half pound of seed potatoes, probably less, yielded 28 pounds of average-sized tubers, some being quite large, and I never before ate potatoes that tasted quite so delicious. Now it is a question whether or not these potatoes matured. They show eyes, but faintly. I shall plant some of them next season and settle the question. I should like to known the particular variety of this potato, since it has proven so adaptable to this climtate. They were shipped by the Northern Commercial Company to Bettles in the summer of 1903 as market potatoes. The result of this magnificent crop is that some full crates of potatoes are being carefully wrapped in blankets and stored for next spring's planting. I have cleared a new patch of ground with fine sandy loam to plant a full crate. I might add the price of fresh potatoes in Coldfoot is 30 cents per pound, and the supply scarce. The result of my crop was 56 pounds to 1 pound of seed potatoes. From one crate (100 pounds) I can expect a crop of 5,600 pounds; value, $1,680. Potato raising 60 miles above the Arctic Circle looks quite alluring.

Ruta-bagas in patch No. 2 produced but little in the root line, but supplied the town with greens with their abundant growth of tops, that remained tender until damaged by successive frost.

During June and the first week in July my meteorological record gives only four "traces" of rainfall. Therefore during that period I watered my garden two or three times per week.

I have a cellar underneath the floor of my office room filled with turnips and ruta-bagas, and a winter supply of cabbage and kale in my cache. Therefore I can say that gardening in this section of Alaska is a lucrative industry.

The garden of our deputy marshal excelled my own in point of crop, especially in ruta-bagas and turnips. The largest turnip, a White Milan, weighed 5½ pounds and was 25 inches in circumference. Turnips weighing 4 and 5 pounds were quite common. Carrots (Scarlet Horn) did fairly well, some being 4 and 5 inches in length. Parsnips did fairly well. Beets made a good showing, with indications that with careful training and attention a reasonably good crop could be raised.

This garden was cleared and manured in the spring and immediately planted in its first year. It is a rich, sandy loam several feet in thickness, with an underlying stratum of very dry sand and gravel, and is termed "not frozen" ground. Years ago fires burned off all timber and moss, leaving the soil, it seems, in a perfect condition.

Henry A. Stade, Twelve-Mile-Road-House on Birch Creek, post-office Circle City, Alaska.—Last winter I wrote and asked you to send me a few seeds, which you very promptly did. They arrived in good time and in good condition. I shall give you my first year's experience in farming in Alaska:

I planted 700 pounds of potatoes, commencing on the 1st day of May, 1904, and planted some as late as the first of June, on ground which I cleared during May. I was surprised this fall to see that the last planting was just as large and good as the first. I harvested in all 20 tons of potatoes, for which I have a ready market at $11 per 100 pounds. Next I planted four papers of Scarlet Horn Carrots. They were the largest and best that anyone ever saw in this country. Some of them were three inches across the top end. I raised 900 pounds in all, and sold them at 15 cents per pound. I planted four papers of parsnips of the Early Round variety. These were as fine and large as the carrots, but I raised only 300 pounds. They sell for 25 cents per pound. I planted four papers of Crimson Globe beets. They also grew to perfection. Some of them weighed 4 pounds, and in all I gathered 620 pounds. These sell at 25 cents per pound. I also planted four papers of turnips of the White Flat Strap-leaf and the Purple-top. Both kinds did well and grew to good size; the largest one weighed 10½ pounds; I gathered 1,500 pounds. I planted four papers of ruta-bagas, which did well; the largest weighed 12 pounds, but these did not yield as well as turnips by 200 pounds; they sell for 8 cents per pound. Four papers of Extra Early Brown Spanish onions came up well, but grew slowly and did not amount to much. Three papers of peas did well, and kept bearing till frost came, September 3. These seeds were all planted in open ground during the month of May.

I planted two papers of Stonemason cabbage and also one paper of cauliflower in the hothouse in April and transplanted them in June, but they did not do at all well. I also planted two papers of beans, select variety, and one Early Red Valentine, but neither of them matured. You will see that I did remarkably well, and I must say that farming in Alaska on a small scale is a success, and I have made more money this year farming than before in mining.

I must not forget to mention my radishes and lettuce, for they were the pride of the table all summer. Many thanks for the seed you sent me last spring, and also for that you also sent me this fall. As this was my first year farming, I am again without seed, but next spring I shall set out carrots, turnips, ruta-bagas, parsnips, and other vegetables and try and raise my own seed.

I will experiment with any seed you would like me to try, and I shall take great pleasure in doing so, for I do think the time is coming very fast when Alaska will produce her own vegetables of all kinds, probably not every year in all places, but when one place should fail the supply in another place would suffice.

A. A. Turnbarge, Farbanks, Alaska.—I send you samples of grains in this mail which I raised this past season (1904) at this place. I took no pains at all with it, but scratched up a small patch on very poor soil, and also harvested it a little too early. I sowed it May 8 and harvested it August 15. The season was very backward, and we had two light frosts during the summer, but I am satisfied that grain will do all right here with fair attention. I did not put fertilizer on the soil. My vegetables were very good, considering the season and the attention given them. I sowed a little of everything for an experiment, and I am sure that in time this will be a farming and self-supporting district. I have sowed Alsike clover and timothy seeds, and will know if the winter is too severe for it by another season.

J. F. Karshner, Magic Hot Springs, Baker Creek Station, Alaska.—This year (1904) I have red currants, black currants, and red raspberries growing wild at my place, also the service berry, or cherry as some call it. I shall try each by cultivation and see what results follow.

When it came to taking care of my potatoes in the latter part of September I found plenty that would weigh from 1½ to 2 pounds; two weighed 3 pounds each. My grain did well. The wheat stooled to from 10 to 14 stalks, the barley from 8 to 12. I never saw grain do better; the grains were of a good size, and the heads were well filled. I shall try sweet corn, tomatoes, watermelons, and muskmelons this year. Celery did well. I shall make it a special crop in 1905. I must tell you of a variety of cabbage that did the best. The Government sent it to a neighbor, and I tried some of it at my place. It has a short solid head and is called Stonemason. I just had one paper for this year; it is a sure header for this place. So is the Jersey Wakefield, but it is not so large or heavy as the Stonemason.

Edgar Crompton, Tanana, Alaska.—The following are the results for 1904 of your seeds planted by me at my station on the banks of the Yukon, opposite the mouth of the Novikakat River, 6 miles above Kohrine's old post and 90 miles below Tanana:

Last year we dug up a considerable plat on a bench about 50 feet above the river and succeeded in raising a fair crop of turnips, carrots, and radishes, which were all the seeds we had to plant. This year nothing seemed to flourish there except the carrots, which yielded a very good crop.

This summer I was able to get a small plat dug and fenced alongside of our buildings in a willow bottom, which has been richly manured. Here everything seems to thrive to perfection, as, indeed, might be expected, as the place has a warm southern slope and the low hills serve as a break to the winds, which are very cold toward fall.

The flowers were grown beneath our cabin window in a small bed about 10 by 15 feet. I gave them more attention than anything else.

Peas (Prolific Early Market) were planted as soon as the ground was thawed sufficiently to dig it. They were well cultivated, but only watered a few times. They grew about 5 feet high, and yielded a very fine crop. I left some for seed, but the pods were still green when they froze.

Beans (Early Red Valentine) were planted at the same time as the peas and close by them. All rotted in the ground. Some others were planted a month later on a hill and yielded a small crop.

Parsnips (Early Round) were planted on the hill and grew about the size of carrots. I believe they will thrive in better soil. Beets (Crimson Globe) were planted on the hill. Most of them were very small. Spinach (Long Standing) did splendidly. We had more than we could use. They did not need watering. Radish (French Breakfast) grew to perfection everywhere it was planted, and was better than any of the other varieties planted. They did not require watering. Mustard (White London and Ostrich Plume) grew a good crop and was cut early in the spring for salad. Cress (Curled) grew a very heavy crop and sprouted up as fast as cut down. It was used all summer. Rhubarb—17 hardy young plants—has been set out in shape for next year.

Lettuce (Morse and California Cream Butter) was started early under cover and transplanted. Both varieties did well, but the latter seemed to me to surpass anything I ever saw before. We found it excellent when boiled like cabbage. Many people who saw them remarked that they never knew of any lettuce before having such huge solid heads. Carrots (Early Horn and Chantenay) were a heavy crop.

Phlox, shirley poppy, sweet alyssum, corn flower, sweet peas, candytuft, nemophila, nasturtium (Madam Gunter and Dwarf), and stocks all did well and bloomed till frost killed them. They were planted early, under cover. The stocks, poppies, and nasturtiums were most admired.

Correspondent, Holy Cross Mission, Alaska.—Last year's crop (1904) was about one-fourth less than the usual quantity. We had a long, cold, dry, and windy spell right after planting season, May 15 to 25, lasting till the beginning of July; then almost continual rain for about three weeks. We had very few real warm days.

The turnips and cabbage did fairly well, but the potatoes were very poor and watery. Barley, oats, and wheat were sown, but nothing matured. I took the greatest care of the new variety of Windsor beans you sent me, giving them the best spot in our little front garden, but the ground kept so cold that it took weeks for them to come above ground, and at frost, September 20, they were only beginning to form pods.

Toward the middle of August we transplanted some strawberry plants, both bush and running varieties. The plants were very strong and healthy. They had been raised in cold frames under glass and had already blossomed when put in the open ground, where they remained all winter with a slight protection of straw. All the running varieties stood the frost bravely, but nearly all the bush varieties perished. The former began to bloom in the beginning of June, but everything is now at a standstill on account of cold weather.

We had real May weather in the month of April. The snow had disappeared about the 15th of that month. The entire month of May was cold with the exception of a few days. We had snow as late as May 25, when most of our planting was over. Ever since that we have had constant rain and dark, cold, showery weather. On July 16 we had a hail shower. The strong winds almost uproot the young plants which are trying to push their way up. These two last summers are the coldest we have seen since we have been in Alaska. There are no two years alike.

I sowed some melons and cucumbers in the hotbeds, and they came up nicely and were doing well till I was obliged to remove the sashes on account of other plants. The air became too cold for their delicate natures. They stopped growing and turned yellow. I have some more cucumbers which I started June 10 in a hotbed by themselves, and they are doing well, but I am careful to keep the glass on at night. I have about 200 strong plants of celery about 7 inches high which I shall plant in trenches as soon as our first crop of radishes is finished, and that will be in a few days.

E. R. Brady, Wickersham, Alaska.—At this time we have prepared for cultivation upward of an acre, and last year Mr. J. R. Anderson, who owns and conducts a large roadhouse here, raised a fine crop of oats. At that time the ground was new, but this year he expects to have a still better crop. He is clearing more ground now, and by this fall we shall have perhaps 5 acres ready for use.

I have a small hotbed which has been in operation since March 20, and at this time has radishes, etc., almost ready for use. This has been a very cold spring in this section, but we hope to have it warm from now until fall. The rainfall here is about the average for the Yukon Valley.

The soil in this section of the country is the same as I have found in all parts of the interior of Alaska. It is of a sandy nature, with some black loam and yellow clay. After the removal of the vegetable growth it is very mellow, and the second year it will produce fine crops. I have never planted anything in this country that did not prove entirely satisfactory. But it may be that I gave more attention to my work than a person would who plans for commercial returns.

The number of acres available for cultivation, or for pasturage, I can not estimate, for many sections of the Forty-mile district are yet unexplored. However, the Mosquito Fork of the Forty-mile is almost entirely good agricultural

land. It is about 5 miles wide on an average and about 40 long. This is estimated. Also the Dennison Fork of the same river is as large and of the same character. A number of homesteads have been taken on the Mosquito Fork. There was a large quantity of wild hay harvested on the Mosquito Fork this last year. One farmer has a mowing machine, rake, etc., and he expects to cut more this year.

[Attention is called to the foregoing description of the valley of Mosquito Fork. It has long been known as an extensive natural meadow, and according to all reports the soil is well adapted to cultivation. In the report for 1901 Mr. Isaac Jones gave a more general description of that portion of the Forty-mile country, which borders on the Eagle-Valdez trail, and then estimated that there were 750,000 acres available for agriculture and pasturage in the valleys of the various branches of the Forty-mile and the Ketchem stock flats. Until a railroad shall penetrate this region it is practically inaccessible.]

Joseph L. Braxton, Tanana Crossing, Alaska.—I have started to farm in the Tanana Valley, and I write for some seed as well as for some information as to what will grow here. We have a fine climate and very good soil. I started to clear off land last July (1904) and I think I shall have 10 acres this spring ready for the plow. I have a cabin 18 by 24 feet, inside measure, and a stable 12 by 18 feet. The only drawback I find is that it costs so much to live and get farm implements. I pay $50 or $60 for flour and $50 per 100 for rice and beans; $75 per 100 for bacon. I should be pleased to hear from the station at any time, and any seed you send will be highly appreciated.

[Tanana Crossing is on the Eagle-Valdez trail, north of the Copper River Valley.]

Adolf Stecker, superintendent Moravian Mission, Bethel, Alaska.—Concerning our garden, we are happy to report good success. In early spring (1904) I worked much in the garden, but it paid me well. We raised the plants in hotbeds first and set them out in the middle of June. Potatoes were planted in the ground May 28 and harvested September 22. While those raised from potatoes brought from the States were good, but small, those we grew from seed raised here last year were large and very good. On one plant we counted 14 potatoes, the largest the size of my fist, the smallest the size of hen eggs.

Cabbage, cauliflower, kale, ruta-bagas, radishes, and turnips did very well. We also had very nice flowers—pansies, stock, cornflower, and others. Everyone who saw our garden wondered at it, and Mrs. Stecker and myself have had much enjoyment in seeing everything do so well.

About 100 yards west of our station is a lake, and in the spring I started a garden there. The ground was all covered with moss, which I removed. I found under it about 6 inches of soil and below that was sand. I put out some potatoes, cabbage, ruta-bagas, and turnips there. The turnips came up in very short time, but they withered away. The cabbage and ruta-baga plants looked fine and green at first, but did not grow, and are now almost as when we put them out. The potatoes grew a little.

If we were only a few miles farther up the river among the trees it would be much better. I went with some Finns up a mountain stream, and there we found some most excellent land. Grass on both sides of the river grew 5 feet high. The Finns thought it a pity that such beautiful land was not used for farming, and that is my opinion, too.

Joseph Kahlen, Carmel, Nushagak River, Alaska.—The months of June and July (1904) were most delightful; August and September were rather wet. Winter set in by the middle of October, but so far has not been unpleasant at all. I could not always find out the actual snowfall; it often seems to snow

when it does not. The air is at times filled with particles of snow carried along by a strong wind and drifting in all directions.

Our gardens have done fairly well. We had a fair crop of good potatoes and exceptionally fine cauliflower. Rhubarb, kale, turnips, cabbage, carrots, ruta-bagas, and radishes did fairly well.

Mr. Rock had planted some rye; it grew to a normal height, but the seed did not mature; it turned black. Peas stood in bloom for a long time; they formed pods, but the peas did not ripen. We keep two cows, a calf, and a horse. We have in places a luxuriant growth of nutritious grasses, and our stock can support itself during the summer. Our supply of hay was cut after the first frost had set in.

In July we tried a new incubator sent us from Philadelphia. Mr. Rock put in 50 eggs, of which number 17 were hatched. It was rather late in the season, much wet weather followed, and only four of the chicks survived. A few of our hens began to lay about the middle of November.

I came here on the last day of May. Shortly afterwards I began cultivating a small piece of land and had the satisfaction of raising a good crop of radishes, kale, and a fairly good supply of fine turnips.

Last summer we made a trip up the Wood River to the lakes and were delighted at the beautiful scenery and luxuriant character of the vegetation. It is a magnificent timber region, in sharp contrast with the treeless region of the lower Nushagak. This lake country will make an excellent grazing country for reindeer.

Elizabeth Schwab, Jesse Lee Home, Unalaska, Alaska.—Your package of seed came to-day, reminding me that I had not as yet given you any of my experience with last year's (1904) seed. Last spring was very late and the summer was cool. I started cabbage in tin cans in March, transplanting them in the latter part of May, and succeeded in having some small heads ready for the table late in September. We have had such nice lettuce and greens. The beets not growing very large, we used the tops for greens. They were nicer than spinach. We started some rhubarb in the hotbed last year and it grew to 2 feet. We transplanted it into the garden this year and inclosed it in boxes. I was afraid it would spoil, as we tried transplanting it before, but the boxes preserved it from its enemies and it was well manured with chicken manure.

I can not tell how the children enjoyed the turnips and ruta-bagas from their gardens and what a blessing and health-preserving benefit our garden is to our flock.

We have also used much of the flower seed. Sweet peas, sweet alyssum, stocks, and many other flowers make our home more beautiful and give their joy and gladness.

Alexander Friedolin, Afognak, Alaska.—I have sown the seeds I received from you as follows:

Cauliflower and cabbage were planted in the box April 14, 1904, transplanted to open ground June 2. I planted turnips, onion sets, and sowed cabbage, kale, celery, radishes, and salsify in open ground on May 11, and transplanted kale and cabbage on June 2. I sowed Romanow wheat, Swedish Select oats, and Manchuria barley, all imported seeds, on May 12. I sowed flowers, ruta-bagas, peas, and cauliflower on May 12 and transplanted the cauliflower June 2. I planted potatoes May 17 and 27. Onions (Extra Early Brown Spanish), beets (Crimson Globe), carrots (Scarlet Horn), ruta-baga (Champion), turnip (White Strap-leaf), parsnip (Early Round), parsley (Early Curled), and radish (French Breakfast), were all sown on May 21. Lettuce and dill were sowed May 29. The result was unsatisfactory this year. The potatoes were

fair. The turnips turned out to be excellent, as also did the ruta-bagas. Radishes, kale, rhubarb, cauliflower, lettuce, and garden flowers were partially a success.

As the packages you sent us contained no cabbage seed, I had to use old seeds, a late variety, and they are growing yet with big leaves and no heads. All vegetables except those mentioned above were a total failure. The season was not favorable, and being away from home nearly the whole summer trying to earn my living somewhere else, I had no opportunity to give them proper attention; hence the failure.

I commenced to take up vegetables, with the exception of cabbage and kale, September 29 and had them all in the cellar by October 1. Romanow wheat is in the milk yet and still growing. Manchuria barley and Swedish Select oats were sowed late and in a cold ground. They are nearly matured, especially the former, although the straw is green yet. The winter wheat and rye matured all right. The heads of rye are not full. They have few seeds, but the wheat is better. I sowed winter wheat and rye in the latter part of August last year. They came up and grew satisfactorily and were of a right height when snow covered them before frost, but early in the spring the snow left the ground and the plants were left exposed, after which we had frost and rain intermittently.

In your report for 1903 you have come to the conclusion that grain can not be grown successfully along the coast. However, I believe that certain grains can be grown successfully on favorable spots, not exactly on the coast, but a mile or so inland. And when the time comes a man can make his living by farming on a small scale. I have grown barley suitable for home use for the last five years without failure, and I have by no means the best ground around here, nor am I giving it extraordinary cultivation.

G. W. Palmer, Knik, Cook Inlet, Alaska.—The seed you sent me last fall were received and planted in the spring of 1904. I gave the natives all that I did not use myself. The summer has been very cold and wet, and very unsatisfactory for gardening. Potatoes have done fairly well. I had about 2 tons on about half an acre of ground. Turnips, ruta-bagas, and carrots did fairly well; cabbage did not head firm and hard as they did last year. Lettuce was fine. Beets, parsnips, radishes, and onions were failures.

The natives' gardens were almost a failure from lack of attention.

Herman Stetler, Lower Kenai Lake, via Seward, Alaska.—In the fall of 1902 I obtained from Mr. Nielsen, in charge of Kenai Station, some Department seeds which were planted in 1903, with the following results:

My gardens were planted on the banks of the Kenai River about 2 miles above the Lower Lake, where they were sheltered from the cold winds from all sides and the open river gives a southern exposure. The soil is alluvial, overlying a gravel deposit to a depth of 16 to 24 inches, well drained and loamy.

The first year, 1903, no manure was used, but this year a compost of fish, grass, leaves, etc., was prepared which added materially in the growth of the vegetables. In 1903 only a small area, perhaps 50 feet square, was planted. The result being so encouraging I was induced to experiment further this season. The first year there was more sunshine and the beets and parsnips did better than they did this season, and the peas (Alaska and Earliest of All) ripened, but the seed when planted did not produce well, half of them not coming up at all and the others very late. The few potatoes I grew I saved for seed and they did much better than those from the States.

This year I planted my potatoes May 5 on manured ground. The other seeds—turnip, beets, carrots, kale, cabbage, lettuce, and radishes—were planted

between that date and May 15, before the ground was thoroughly thawed out, on fertilized soil. Such care was given them as a lone prospector could find time for and the results were entirely satisfactory.

From less than one-fourth of an acre I grew 3 sacks of potatoes besides what was used, 5 sacks of ruta-bagas, 8 sacks of White Egg turnips, 1 bushel of carrots, and 100 heads of cabbage. Beets and parsnips were very poor, not over one-half bushel together. Besides this we had plenty of kale, lettuce, radishes, and some peas, the latter did not do well. On enriched land the tendency was for the peas and potatoes to go to vines.

The season was exceptionally cold and rainy, not at all favorable to vegetable growth, but the following sizes of some turnips will demonstrate the possibilities of our section in the garden line. One Purple Top turnip 29¼ inches in circumference, 3½ inches thick; 12 or more White Egg turnips were 13 inches long, 20 to 23 inches around; cabbage which weighed 5 or 6 pounds; ruta-bagas weighing 4 to 5 pounds. Cabbage and ruta-bagas were transplanted. Kale grew very thrifty, as did the lettuce and radishes.

Mrs. J. M. Stewart, Valdez, Alaska.—I wish to tell you how successful I was during the season of 1904 with the garden planted with seed you sent me in the spring.

I had lettuce and radishes on June 2, beautifully crisp and tender. We thought the curled lettuce a nicer variety than the Big Boston, which we planted this year. We found the French Breakfast radishes matured more quickly and were more tender than a longer variety of which I forget the name. We raised five different crops of radishes.

I was more successful with onion sets than with seed, as I left the seed till it was too late for planting.

I had 30 beautiful heads of cauliflower from plants started March 20 in the house and transplanted May 15. I had turnips, large ruta-bagas, and beets, which were not very large but very sweet and good. We had plenty of kale and rhubarb, which I had started the year before.

Then I had lots of flowers. I found sweet alyssum and pansies the most satisfactory, as they blossom early and are not injured easily by the frost. I picked the last bunch of flowers October 28. There were, besides candytuft, mignonette, cornflower, asters, and some English daisies started in the house, of which I was especially proud.

I felt much encouraged with my garden, for the season though early was very rainy and cold.

W. H. Marrett, Haines, Alaska.—Wheat, oats, barley, and buckwheat just barely matured during the last season (1904), which has been the coldest I have known in Alaska. Of such vegetables as potatoes, turnips of numerous varieties, cabbage, cauliflower, carrots, beets, parsnips, radishes, lettuce, celery, and peas I have raised an abundance for table use, and several tons surplus of potatoes, turnips, carrots, and cabbage, but in no case was the yield per acre at all remarkable. This year and also last the first frost was not until October. I plowed last season 12 acres in December, finishing the 12th of the month. Most years I could plow nearly or quite as late. Spring plowing is always best, however, on my farm, as the fall of snow prevents much freezing, so that the root crops if left in the ground come out in the spring uninjured by the cold.

Hay has been my only large crop. I have harvested and thoroughly cured this past season a little over 60 tons. Every year there has been some excellent weather for making hay, but it can not be counted on at any particular time. During 1903 there was several weeks of clear, sunshine and no rain. The previous year there was not two successive days during July and August without some rain, but that year the really good hay weather was in June.

This year it was late in August and September. I have a silo, but prefer putting my entire crop of grass into hay when I can hit suitable weather for making it.

My attention has been called several times to the fact that the cultivated grasses, such as timothy and clover, have winterkilled badly in some sections. Has not this been chiefly on account of insufficient drainage? All along those many miles of trail the pack train traversed during the Yukon rush the volunteer clover and timothy grow most luxuriantly and does not appear to winterkill in the least. The large parade ground at the military post which was sowed last July with varieties and proportions of seed recommended by you wintered perfectly and is looking remarkably well, though it has been much used, and for several months the horses and cattle were not kept off.

Henry Partridge, Hoonah, Alaska.—I received from the Department beet, carrot, pea, turnip, parsnip, ruta-baga, lettuce, and onion seeds. They all grew very well. With 600 turnip plants I raised 1,800 pounds of nice, juicy turnips; 650 ruta-baga plants weighed 1,920 pounds—the finest ruta-bagas I ever tasted; 250 carrot plants yielded 118 pounds; some carrots were 12 inches long and 9 inches in circumference; 80 parsnip plants yielded 50 pounds; 100 onion plants yielded 18 pounds, the largest being about 2 inches in diameter; 100 beets weighed 70 pounds, and were of the best quality one could wish to see. Peas and lettuce grew fine.

I also planted 50 pounds of potatoes which I took from a sack which we had bought to eat. To my great surprise the 50 pounds grew to 490 pounds of the best and mealiest potatoes I ever ate.

This little garden is located about 20 miles from Hoonah village, near Swanson Harbor. It is 80 by 100 feet. The soil is a deep black loam. To fertilize the ground I used decayed seaweed and old salmon from the streams. I expect too add a little to the patch every year until it is a modern farm. I am satisfied that farming can be made a success in Alaska.

Charles B. Bohm, Tree Point Light Station. Alaska.—This year's (1904) crop has not been exceedingly good on account of using new ground and no fertilizer. I have been trying to catch fish for use as fertilizer with a view to improving the soil.

I have a few onions, some lettuce, some Extra Early Paris cauliflower, and some potatoes, but they all grew very slowly. I also have a little Early Curled parsley and a few heads of cabbage. The Crimson Globe beets grew up a few inches and then stopped. Champion ruta-bagas and Tall Curled Scotch kale are growing fine.

Flowers have done well. The wallflower is 3 feet high, but without blossoms. The poppies are 3½ feet and full of blossoms.

G. W. Gervais, Hollis, Alaska.—In regard to the growth of seed planted in 1904, I will say that it was a very backward year, and nothing did as well this year as last. The Early Jersey Wakefield cabbage and the cauliflower were fairly good; also the Early turnip and Long Red radishes and the Mammoth Red Leaf lettuce. Onions from sets did well. Rhubarb is a great success. I shall try again in 1905.

Nathan B. Whitfield, Ketchikan, Alaska.—Owing to the backward and cool spring in 1904, gardening did not begin here till the last of May or the first of June. The seed sent me were planted on the same soil which last year produced better results than it did this year with the same amount of attention.

Last year (1903) lettuce grew 14 inches across the head, this year from 10 to 12 inches; last year turnips grew to 5 inches in diameter, this year 4 inches; last year beets grew to 3½ inches in diameter, this year 2½ inches; last year

carrots reached 1½ inches in diameter, this year 1 inch; last year radishes grew to 1½ inches in diameter, this year 1 inch; last year onions were 2 inches in diameter, this year 1 inch; last year cabbages headed, this year they did not; the beans bloomed last year, this year they did not, being a very tender plant; this climate is too cold for them to mature. Kale grew well, bloomed, but the seeds would not ripen. Peas grew 5½ feet high, and were loaded with fruit, which did not ripen.

The flowers did not do well. They all came up, but only the sweet peas bloomed. I have three plants of sunflower 2 feet high, which are protected. One has a bud, but I do not think it will bloom.

From information derived from the natives and old white settlers this has been an unusually wet and cold year, and is not a good criterion of the productive qualities of Alaska horticulturally.

SOIL TEMPERATURES.

Readings are taken at 7 a. m. Thermometers record the temperature at depths of 6 and 24 inches, respectively. The radiation thermometer shows the daily minimum temperature 6 inches above the surface of the ground where the soil thermometers are planted.

Soil temperatures.

SITKA EXPERIMENT STATION.

Date.	Temperature.			Date.	Temperature.			Date.	Temperature.		
	At 7 a. m. 6 inches below surface.	At 7 a. m. 24 inches below surface.	Minimum at 6 inches above surface.		At 7 a. m. 6 inches below surface.	At 7 a. m. 24 inches below surface.	Minimum at 6 inches above surface.		At 7 a. m. 6 inches below surface.	At 7 a. m. 24 inches below surface.	Minimum at 6 inches above surface.
1905.	°F.	°F.	°F.	1905.	°F.	°F.	°F.	1905.	°F.	°F.	°F.
May 8	45	42.5	38	June 13	49	48	38	July 19	56.5	52	49
May 9	44	42.5	37	June 14	50.5	48	37	July 20	58.5	52	50
May 10	46	42.5	38	June 15	51.5	48	45	July 21	58.5	52	52
May 11	45.5	43	37	June 16	51	48	46	July 22	58.5	52.5	54
May 12	46	43	41	June 17	52	48	47	July 23	58	52.5	50
May 13	45	43.5	35	June 18	51	48	45	July 24	57.5	52.5	44
May 14	45	43.5	31	June 19	51.5	48.5	44	July 25	57	53	43
May 15	45	43.5	34	June 20	52	48.5	47	July 26	57	53	44
May 16	44	43.5	40	June 21	52.5	48.5	47	July 27	58	53	48
May 17	44	43.5	36	June 22	53.5	48.5	42	July 28	57	53	52
May 18	45.5	43.5	39	June 23	53	49	49	July 29	57	53	52
May 19	45.5	43.5	41	June 24	56	49	47	July 30	57	52	52
May 20	45.5	44	39	June 25	58	49.5	50	July 31	57	53	44
May 21	46.5	44	30	June 26	57	49.5	42	Aug. 1	58	53.5	46
May 22	47	44	31	June 27	56	50	50	Aug. 2	58	53.5	52
May 23	47.5	44	36	June 28	55	50	47	Aug. 3	58.5	53.5	51
May 24	48	44	37	June 29	54.5	50.5	48	Aug. 4	57	53.5	52
May 25	48	45.5	35	June 30	54.5	50.5	48	Aug. 5	57	53.5	42
May 26	48.5	45	35	July 1	55.5	50.5	51	Aug. 6	58	53.5	48
May 27	50	45	35	July 2	55	50.5	48	Aug. 7	58	53.5	52
May 28	50.5	45	41	July 3	54.5	50.5	49	Aug. 8	57.5	54	51
May 29	50	45.5	36	July 4	54	51	50	Aug. 9	57.5	54	51
May 30	50	46	36	July 5	54	51	47	Aug. 10	57.5	54	49
May 31	50	46	36	July 6	52	51	44	Aug. 11	57	54	52
June 1	50.5	46	36	July 7	53	51	47	Aug. 12	57	54	51
June 2	50.5	46	37	July 8	53	51	47	Aug. 13	57	54	41
June 3	50.5	46.5	35	July 9	54	51	47	Aug. 14	57	54	42
June 4	50.5	46.5	40	July 10	55	51	49	Aug. 15	56	54	42
June 5	50.5	47	34	July 11	55	51	46	Aug. 16	56	54	45
June 6	51.5	47	40	July 12	55	51	47	Aug. 17	56	54	47
June 7	52	47	40	July 13	54.5	51	48	Aug. 18	56	54	44
June 8	52	47.5	47	July 14	55	51	49	Aug. 19	55.5	54	45
June 9	51.5	47.5	46	July 15	55	51	52	Aug. 20	55	54	44
June 10	50.5	47.5	37	July 16	56.5	51	50	Aug. 21	55	54	46
June 11	50.5	48	37	July 17	56	51.5	50	Aug. 22	54	54	46
June 12	49.5	48	41	July 18	55.5	52	50	Aug. 23	54	53.5	46

Soil temperatures—Continued.

SITKA EXPERIMENT STATION—Continued.

Date.	Temperature.			Date.	Temperature.			Date.	Temperature.		
	At 7 a. m. 6 inches below surface.	At 7 a. m. 24 inches below surface.	Minimum at 6 inches above surface.		At 7 a. m. 6 inches below surface.	At 7 a. m. 24 inches below surface.	Minimum at 6 inches above surface.		At 7 a. m. 6 inches below surface.	At 7 a. m. 24 inches below surface.	Minimum at 6 inches above surface.
1905.	° F.	° F.	° F.	1905.	° F.	° F.	° F.	1905.	° F.	° F.	° F.
Aug. 24	54	53.5	46	Sept. 12	53.5	52	49	Oct. 1	46	49.5	42
Aug. 25	56	53.5	46	Sept. 13	53.5	52	44	Oct. 2	45.5	49	41
Aug. 26	55	53.5	49	Sept. 14	53	52	41	Oct. 3	44	49	43
Aug. 27	54.5	53.5	48	Sept. 15	53	52	48	Oct. 4	46	49	40
Aug. 28	54	53.5	38	Sept. 16	52.5	52	48	Oct. 5	46.5	48.5	41
Aug. 29	53	53.5	35	Sept. 17	50.5	52	40	Oct. 6	46.5	48.5	38
Aug. 30	53	53.5	36	Sept. 18	50.5	52	39	Oct. 7	46.5	48.5	38
Aug. 31	53	53	50	Sept. 19	51	52	46	Oct. 8	46.5	48.5	35
Sept. 1	53	53	49	Sept. 20	51	52	44	Oct. 9	45	48	39
Sept. 2	53	53	46	Sept. 21	50	51.5	39	Oct. 10	46	48	48
Sept. 3	53	53	44	Sept. 22	48	51	39	Oct. 11	47.5	48	42
Sept. 4	53	53	44	Sept. 23	47.5	51	32	Oct. 12	47	48	40
Sept. 5	53	53	39	Sept. 24	48	51	40	Oct. 13	48	48	41
Sept. 6	53	53	35	Sept. 25	48.5	50.5	45	Oct. 14	48	48	33
Sept. 7	52.5	53	38	Sept. 26	48	50	35	Oct. 15	43	48	27
Sept. 8	52	52.5	35	Sept. 27	48	50	38	Oct. 16	43	48	24
Sept. 9	52	52	49	Sept. 28	48	50	40	Oct. 17	42.5	47	29
Sept. 10	53	52	41	Sept. 29	47	49.5	40	Oct. 18	40	47	32
Sept. 11	53	52	45	Sept. 30	46	49.5					

COPPER RIVER EXPERIMENT STATION.

May 10	38.5	32		June 27	59	48.5	38	Aug. 14	49	46.5	7
May 11	41	32	24	June 28	57.5	48.5	30	Aug. 15	53	46.5	26
May 12	43	32	21	June 29	55.5	48.5	38	Aug. 16	52	46.5	32
May 13	37.5	32	14	June 30	53	48.5	35	Aug. 17	53	46.5	31
May 14	36	32	6	July 1	55	48	33	Aug. 18	52.5	46.5	19
May 15	39	32	15	July 2	56.5	48	38	Aug. 19	51	47	17
May 16	40.5	32	14	July 3	57.5	48	37	Aug. 20	54	47	24
May 17	39	32	9	July 4	56	48	36	Aug. 21	49	47	9
May 18	41	32	21	July 5	51	48	33	Aug. 22	50	46.5	8
May 19	38	32	8	July 6	52.5	47.5	39	Aug. 23	49	46	3
May 20	40	32.5	10	July 7	52	47	32	Aug. 24	49.5	46	5
May 21	43.5	32.5	31	July 8	50	47	30	Aug. 25	49	46	30
May 22	43	32.5	19	July 9	51.5	46.5	22	Aug. 26	44.5	45.5	10
May 23	42	33	31	July 10	55.5	46	23	Aug. 27	43	45	8
May 24	44	33	28	July 11	56	46.5	37	Aug. 28	44	43.5	0
May 25	45	33.5	34	July 12	54.5	47.5	33	Aug. 29	47	43.5	24
May 26	44.5	33.5	31	July 13	52.5	47.5	35	Aug. 30	43.5	43.5	29
May 27	45.5	33.5	35	July 14	54.5	47.5	21	Aug. 31	47.5	43.5	24
May 28	43.5	34	15	July 15	56	47.5	37	Sept. 1	44	43.5	6
May 29	44.5	34	18	July 16	53	47.5	33	Sept. 2	43.5	43.5	5
May 30	43.5	34.5	14	July 17	54	47.5	30	Sept. 3	47	43.5	20
May 31	45.5	35	30	July 18	52	47.5	17	Sept. 4	44	43.5	10
June 1	46	35.5	25	July 19	55	47.5	18	Sept. 5	43.5	43.5	22
June 2	48	36	24	July 20	58	48	21	Sept. 6	43	45.5	4
June 3	47.5	37	24	July 21	58.5	48.5	40	Sept. 7	43	43.5	9
June 4	45	37	13	July 22	55	48.5	21	Sept. 8	44	43.5	16
June 5	47.5	37	26	July 23	58.5	49	22	Sept. 9	44.5	45.5	20
June 6	50	37.5	30	July 24	60.5	49.5	37	Sept. 10	43	43.5	9
June 7	47.5	38	18	July 25	60.5	50	26	Sept. 11	43.5	44	23
June 8	50	38.5	32	July 26	61	50.5	24	Sept. 12	43.5	42	14
June 9	48	38.5	18	July 27	62.5	51	34	Sept. 13	43.5	43	16
June 10	48.5	39	20	July 28	62	51	27	Sept. 14	43	43	20
June 11	47	39.5	12	July 29	56	51	25	Sept. 15	44	43	17
June 12	48	39.5	29	July 30	57	51.5	21	Sept. 16	43	43	18
June 13	45.5	39.5	29	July 31	59	51.5	24	Sept. 17	44	43	14
June 14	47	39.5	28	Aug. 1	57	51	31	Sept. 18	40.5	42.5	15
June 15	48.5	40	26	Aug. 2	56	51	32	Sept. 19	39	42.5	6
June 16	50	40.5	19	Aug. 3	56	50	34	Sept. 20	38	42	13
June 17	48	41	32	Aug. 4	55	49.5	27	Sept. 21	38	41	14
June 18	46.5	41	22	Aug. 5	54	49	34	Sept. 22	38	40.5	13
June 19	50.5	41	35	Aug. 6	53	48.5	30	Sept. 23	38	40.5	5
June 20	51	41.5	21	Aug. 7	54	48.5	24	Sept. 24	34.5	39.5	− 5
June 21	51.5	42	18	Aug. 8	55	48.5	33	Sept. 25	33	39	− 5
June 22	57	43	39	Aug. 9	54	48.5	34	Sept. 26	33.5	38	− 3
June 23	58	44.5	38	Aug. 10	53	48	36	Sept. 27	33	37.5	2
June 24	58.5	45.5	28	Aug. 11	53	47.5	30	Sept. 28	33	37	− 3
June 25	60.5	47	31	Aug. 12	50.5	47.5	23	Sept. 29	33.5	37	− 1
June 26	59	48	36	Aug. 13	49.5	47	15	Sept. 30	32.5	36.5	− 4

Soil temperatures—Continued.

KENAI EXPERIMENT STATION.

Date.	Temperature.		Date.	Temperature.		Date.	Temperature.	
	At 7 a.m. 6-inch thermometer.	At 7 a.m. 24-inch thermometer.		At 7 a.m. 6-inch thermometer.	At 7 a.m. 24-inch thermometer.		At 7 a.m. 6-inch thermometer.	At 7 a.m. 24-inch thermometer.
1905.	°F.	°F.	1905.	°F.	°F.	1905.	°F.	°F.
May 4	35.5		June 13	46.5	38	Aug. 23	51.5	50
May 5	33.5		June 14	46.5	38.5	Aug. 24	52.5	50
May 6	33.5		June 15	48.5	38.5	Aug. 25	53	50
May 7	34		June 16	46.5	39	Aug. 26	50.5	50
May 8	34		June 17	46	39.5	Aug. 27	48.5	50
May 9	34		June 18	46	39.5	Aug. 28	49	49.5
May 10	35		June 19	47	39.5	Aug. 29	51	49.5
May 11	35.5		June 20	48.5	40	Aug. 30	51	49
May 12	35		June 21	48	40	Aug. 31	49.5	49
May 13	35		June 22	48.5	40.5	Sept. 1	51.5	49
May 14	36		June 23	47.5	40.5	Sept. 2	51	49
May 15	36		June 24	49.5	41	Sept. 3	47.5	49
May 16	37.5		June 25	52	41	Sept. 4	48	49
May 17	38.5		June 26	51.5	42	Sept. 5	47.5	48.5
May 18	37.5		June 27	52.5	42	Sept. 6	47.5	48.5
May 19	41.5		June 28	53	42.5	Sept. 7	48.5	48
May 20	39		June 29	52	43	Sept. 8	49	48
May 21	39.5		June 30	51.5	43	Sept. 9	49	48
May 22	39		Aug. 1	57	50	Sept. 10	50	48
May 23	40.5		Aug. 2	55.5	50	Sept. 11	48.5	47.5
May 24	40.5		Aug. 3	55	50.5	Sept. 12	45	47.5
May 25	40		Aug. 4	55	50.5	Sept. 13	46.5	47
May 26	42		Aug. 5	55	50.5	Sept. 14	48.5	46.5
May 27	42		Aug. 6	57	50.5	Sept. 15	48	46.5
May 28	40.5		Aug. 7	55.5	50.5	Sept. 16	48	46.5
May 29	42		Aug. 8	56	50.5	Sept. 17	45	46.5
May 30	42		Aug. 9	54.5	50.5	Sept. 18	45	46
May 31	43		Aug. 10	53	50.5	Sept. 19	43.5	45.5
June 1	44	35	Aug. 11	52.5	50.5	Sept. 20	43.5	45.5
June 2	44.5	35	Aug. 12	53	50	Sept. 21	42.5	45
June 3	44.5	35.5	Aug. 13	52.5	50	Sept. 22	42.5	44.5
June 4	44	35.5	Aug. 14	53	50	Sept. 23	40	44
June 5	46	36	Aug. 15	52.5	50	Sept. 24	39	43.5
June 6	45	36.5	Aug. 16	53	50	Sept. 25	37.5	43
June 7	45	37	Aug. 17	51.5	50	Sept. 26	37	42.5
June 8	44.5	37	Aug. 18	54	50	Sept. 27	36.5	42
June 9	47.5	37.5	Aug. 19	54	50	Sept. 28	36.5	41.5
June 10	43.5	37.5	Aug. 20	53	50	Sept. 29	35.5	41.5
June 11	43.5	37.5	Aug. 21	52.2	50	Sept. 30	35	41
June 12	44	38	Aug. 22	53	50			

METEOROLOGICAL REPORTS.

As in former years, the special agent has had general supervision of the voluntary weather observers of the Weather Bureau of Alaska. In the following tables are given condensed reports taken from the daily records of the different observers:

Meteorological observations.

SITKA. C. C. Georgeson, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1904.	° F.	° F.	° F.	Inches.				
October	59	33	46.39	10.38	4	11	15	25
November	59	30	40.20	8.68	1	6	23	24
December	51	24	38.95	8.08	0	5	26	25
1905.								
January	55	22	36.40	3.12	7	8	16	9
February	53	20	37.12	4.78	5	6	17	13
March	65	31	43.93	4.21	7	7	17	22
April	57	25	42.80	7.52	10	4	16	20
May	65	32	47.11	2.44	11	12	8	16
June	84	40	52.80	2.25	8	7	15	13
July	73	44	56.38	2.83	15	5	11	14
August	69	45	56.12	7.38	8	5	18	16
September	64	35	50.70	8.80	6	17	7	7

KENAI. P. H. Ross, observer.

1904.								
October	56	9	35.92	1.71	10	2	19	24
November	39	−21	17.08	.26	10	7	13	5
December	39	−20	14.99	.66	13	5	13	11
1905.								
January	39	−14	16.07	.29	20	5	6	5
February	48	7	31.22	.92	1	4	23	8
March	59	10	34.17	.57	8	9	14	4
April	68	8	38.64	.46	5	16	9	5
May	63	22	44.22	.84	12	13	6	11
June	69	28	31.59	.84	16	7	7	10
July	81	36	55.75	1.06	13	6	12	10
August	78	27	54.94	6.25	12	7	12	19
September	72	13	43.64	.78	15	7	8	6

COPPER CENTER. J. W. Neal, observer.

1904.								
October	55	0	30.51	0.48	15	8	8	6
November	34	− 29	− 3.33	.36	14	6	10	9
December	32	− 31	− 4.69	.68	3	15	13	6
1905.								
January	39	− 44	− 7.93	.29	16	4	10	4
February	44	− 32	9.81	1.01	14	10	4	2
March	47	1	21.82	2.00	22	2	7	1
April	56	6	31.46	.00	13	8	9	0
May	69	20	44.32	.48	3	16	12	7
June	88	27	55.95	.50	4	18	8	5
July	88	33	59.19	1.35	7	12	10	7
August	74	20	52.22	.72	6	10	15	8
September	67	12	38.86	1.94	9	4	16	10

RAMPART. Fred E. Rader, observer.

1905.								
June[a]	80	31	54.7	1.33	2	8		
July	86	32	55.7	1.99	8	8	15	13
August	96	26	54.5	2.19	9	10	12	13
September	60	13	35.10	1.70	3	5	22	11

[a] Ten days.

Meteorological observations—Continued.

LORING (FORTMANN SALMON HATCHERY). Fred Patching, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy	Rain or snow.
1904.	° F.	° F.	° F.	*Inches.*				
July	76	36	53.36	7.79	5	9	17	23
August	82	41	58.48	1.15	13	4	14	8
September	72	34	50.5	20.20	5	1	24	22
October	67	28	45.74	26.01	5	3	23	23
November	58	30	41	32.10	.....	6	24	30
December	54	15	38.36	20.01	.....	6	25	27
1905.								
January	41	7	25.5	5.18	5	9	17	13
February	48	9	32.1	13.27	.....	6	22	15
March	63	26	40	16.53	.....	4	27	23
April	66	21	42.4	11.65	7	16	7	21
May	93	29	50	9.46	15	4	12	15
June	91	41	58.6	.84	14	3	13	4
July	87	42	60.2	5.26	18	2	11	14
August	85	39	57.93	13.43	8	5	23	23
September	70	35	50.5	13.85	8	10	17	21
October	55	23	43.65	17.94	3	9	19	23
PETERSBURG. J. A. Goding, observer.								
1904.								
October	69	31	45.15	13.89	6	.....	25	6
November	61	25	31.04	13.52	4	11	15	4
1905.								
April	62	21	42.36	7.17	14	4	12	16
May	72	28	49.91	3.03	15	8	8	12
June	80	39	55.73	1.95	11	3	16	9
July	76	39	56.67	4.46	14	3	14	10
August	80	35	26.7	10.76	6	5	20	4
JUNEAU. S. J. Sharick, observer.								
1904.								
October	63	29	48.54	10.14	12	.....	19	22
November	53	22	38.93	8.79	12	.....	18	28
December	52	17	38.56	9.88	11	.....	20	28
1905.								
January	47	14	32.76	3.28	25	.....	6	7
February	51	14	34.14	2.85	23	.....	5	9
March	56	30	41.06	8.40	18	.....	12	18
April	66	30	40.93	6.76	14	.....	16	15
May	74	33	49.31	3.83	27	.....	4	12
June	84	41	57.06	3.68	21	.....	9	12
July	83	49	59.91	1.93	23	.....	8	11
August	73	38	27.39	8.83	14	.....	17	18
September	68	35	50.44	6.11	12	.....	18	25
October	56	27	43.66	12.74	11	.....	20	15
SKAGWAY. H. D. Clark, observer.								
1904.								
October	61	24	43.3	5.35	6	15	10	16
November	44	20	32.5	3.73	1	16	13	13
1905.								
January	39	2	24.5	.....	15	7	9	.....
February	49	9	28.5	1.14	9	8	11	2
March	54	26	38	1.14	7	14	10	9
April	58	25	41.5	1.27	10	17	3	3
May	75	25	50	1.11	16	10	5	3
June	84	36	57.7	.10	10	11	9	1
July	83	43	59.3	.16	18	6	7	5
August	75	32	55.5	2.14	5	16	10	6
September	64	32	48.6	2.67	4	15	11	15
October	55	26	41.06	2.47	6	10	15	5

Meteorological observations—Continued.

KILLISNOO. Joseph Zuboff, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1904.	° *F.*	° *F.*	° *F.*	*Inches.*				
October	57	29	41.8	0.20	7	21	4	20
November	52	28	37.6	9.20	2	26	2	24
December	53	16	36.2	8.55	2	23	6	23
1905.								
January	43	12	29.10	1.90	9	17	5	9
February	50	14	32.6	2.80	1	25	2	16
March	53	26	39.49	2.60	4	13	14	16
April	61	24	41.2	2.20	7	14	9	9
May	64	31	47.7	3	18	7	8	8
June	83	40	53.2	1.20	10	9	11	6
July	71	41	55	1.60	9	12	10	5
August	74	36	54.05	4.30	4	10	17	14
September	62	35	48.4	4.75	3	4	23	16
October	55	26	42.62	4.10	6	5	20	16

ORCA. W. J. Shephard, observer.

1904.								
October	53	30	40.38	27.57	6	.....	25	25
November	46	15	32.51	9.66	6	11	13	14
December	47	21	32.53	19.05	5	11	15	17
1905.								
January	45	21	31.17	8.20	12	8	11	11
February	45	22	33.94	11.55	6	9	13	11
March	61	22	38.86	12.51	9	4	18	18
April	70	27	41.69	8.60	12	2	16	14
May	72	30	45.91	10.41	8	11	12	16
June	83	37	53.6	6.51	11	11	8	12
July	84	43	58.9	5.02	10	18	3	7
August	80	40	56.30	14.59	12	4	15	17
September	79	30	71.06	9.54	15	8	7	13
October	64	31	42.46	6.54	9	13	9	18

FORT LISCUM. C. J. Steadman, observer.

1904.								
October	52	13	35.5	9.35	10	2	19	21
November	40	11	18.3	2.21	9	5	16	13
December	42	9	19	8.31	5	5	21	22
1905.								
January	44	7	13.44	2.12	18	2	11	8
February	45	9	29.07	1.93	7	4	17	12
March	58	11	32.07	1.64	10	8	13	9
April	57	10	36.23	3.41	12	7	11	12
May	63	27	43.51	.84	9	8	14	15
June	76	31	51.7	.69	11	12	7	11
July	75	38	56.6	1.40	6	15	10	14
August	70	31	53.34	4.52	9	2	20	20
September	65	20	42.2	1.86	14	4	12	11

TYONEK. Durell Finch, observer.

1905.								
June	67	37	52.06	1.27	16	.....	14	6
July	80	42	58.47	.92	16	3	12	5
August	75	40	57.27	4.75	15	2	14	9
September	79	22	47.63	.92	17	5	8	3

Meteorological observations—Continued.

WOOD ISLAND. S. A. Coldwell, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1904.	° *F.*	° *F.*	° *F.*	*Inches.*				
October	57	24	42.27	4.84	12	.....	19	11
November	52	12	34.7	5.20	7	.....	23	11
December	55	10	32.74	3.64	10	.....	21	11
1905.								
January	53	20	33.33	4.80	10	.....	21	7
February	50	28	38.8	3.90	4	.....	24	12
March	65	30	40.42	2.60	10	.....	21	7
June	74	42	54.29	3.10	8	.....	22	11
July	74	32	36.72	2.10	11	.....	20	3
August[a]	74	31	53.88	.....	7	.....	14	.....
September	55	32	43.95	1.80	5	4	21	2

SUNRISE. A. Lawson, observer.

1904.								
October	53	13	35.5	9.35	10	2	19	21
November	40	−11	18.3	2.21	9	5	16	13
December	42	− 9	19	8.31	5	5	21	22
1905.								
January	44	− 7	13.44	2.12	18	2	11	8
February	45	9	29.07	1.93	7	4	17	12
March	58	11	32.07	1.64	10	8	13	9
April	57	10	36.23	3.41	12	7	11	12
May	63	27	43.51	.84	9	8	14	15
June	76	31	51.7	.69	11	12	7	11
July	75	38	56.6	1.40	6	15	10	14
August	70	31	53.34	4.52	9	2	20	20
September	65	20	42.2	1.86	14	4	12	11

COAL HARBOR, UNGA ISLAND. Henry S. Tibbey, observer.

1904.								
September	64	33	48.33	3.73	10	8	12	9
October	57	28	39.61	3.08	7	10	14	18
November	43	17	31.91	2.51	11	7	12	6
December	39	4	25.4	2	10	13	8	14
1905.								
January	42	4	31.3	.17	8	14	9	5
February	42	11	33.11	9.03	6	9	13	19
March	49	11	32.7	1.20	10	16	5	6
April	56	19	38.7	18.92	5	14	11	27
May	56	29	42.7	6.76	1	18	12	23
June	69	37	48.8	4.44	4	8	18	20
July	74	40	55.1	1.75	10	8	13	6
August	70	40	55.6	2.20	13	11	7	9
September	66	35	48.8	2.95	12	9	9	11

DUTCH HARBOR. F. Schroder, observer.

1905.								
May[b]	55	30	42.8	3.66	4	6	10	10
June	62	37	47	4.69	3	12	15	14
July	69	49	52.26	1.73	2	15	14	8
August	68	42	52.78	3.39	3	5	23	12
September	61	33	46.1	3.46	5	8	17	14

[a] Twenty-one days.

[b] Twenty days.

Meteorological observations—Continued.

NUSHAGAK. J. Kahlen, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1904.	° F.	° F.	° F.	Inches.				
August	67	37	51.39	4.52	5	2	24	18
September	73	24	46.84	4.16	14	1	15	9
October	54	3	33.22	1.66	13	6	12	11
November	37	−15	15.4	.....	15	4	11	.....
December	42	−54	10.5	.56	15	1	15	4
1905.								
January	38	−15	16.9	.20	18	3	10	2
February	44	− 7	25	1.45	7	1	20	4
March	47	−18	23	.40	16	4	11	1
April	52	7	32.8	.40	12	3	15	1
May	61	.....	41	2.51	10	4	17	12
June	71	18	22.93	2.75	10	3	17	14
July	78	36	56.77	3.84	14	2	15	11

KOTZEBUE. Dana Thomas, observer.

1904.								
May	55	9	30.5	.....	.....	.....	.....	.....
June	.....	.....	.....	.....	.....	.....	.....	.....
July	70	40	55.8	.....	.....	.....	.....	.....
August	.....	.....	.....	.....	.....	.....	.....	.....
September	65	24	41.16	.....	.....	.....	.....	.....
October	57	5	27.70	.....	.....	.....	.....	.....
November	22	−25	8.16	.....	.....	.....	.....	.....

TEIKHELL. J. H. Embleton, observer.

1904.								
October	50	9	31	2.82	9	.....	22	14
November	40	−23	4.51	.90	14	.....	16	10
December	35	−22	2.34	2.94	20	.....	11	8
1905.								
January	34	−26	.27	.98	18	1	12	2
February	42	−21	.11	.49	15	.....	13	2
March	50	− 5	23.46	1.31	15	4	12	2
April	51	1	30.59	.....	.....	.....	.....	.....
May	68	20	43.05	.....	20	3	8	.....
June	70	34	53	.80	18	6	6	1
July	80	32	57	1.05	21	3	7	4
August	75	24	51	.72	9	3	18	8
September	66	15	38.5	1.01	9	1	20	11

CHESTOCHENA. John A. Gustofoson, observer.

1904.								
October	47	4	28.20	.....	9	10	12	.....
November	35	−26	7.53	.....	19	8	3	.....
December	32	−29	7.82	0.2	21	8	2	1
1905.								
January	45	−33	8.26	.5	23	2	5	1
February	38	− 1	33.40	.25	15	5	7	2
March	50	− 8	22.52	.....	15	11	5	.....
April	55	10	31.89	.....	20	6	4	.....
May	68	20	29.14	.48	3	17	11	3
June	87	31	35.74	.90	14	6	10	11
July	80	37	56.93	3.19	19	2	10	12
August	81	27	52.48	3.20	12	3	15	18
September	59	16	38.41	3.11	10	8	12	12

Meteorological observations—Continued.

KETCHEMSTOCK. Daniel B. McCarthy, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1904.	° *F.*	° *F.*	° *F.*	*Inches.*				
August	75	28	53	0.94	12	16	3	4
September	64	0	34.3	.59	.....	28	2	2
October	51	−10	22.5	.30	7	21	2	2
November	34	−41	7.5	.03	4	26	.....	1
December	25	−41	4.1	.18	3	22	5	3
1905.								
January	10	−52	4.1	.9	12	13	6	1
February	34	−44	14.6	.10	6	10	12	1
March	45	0	8.99	.5	11	12	8	1
April	35	0	9.9	4	23	3	4	3
May	67	27	21.01	.2	13	10	8	1
June	86	21	56.4	1.58	14	10	6	3
July	83	31	55.1	.4	12	13	6	3
August	78	17	49.4	1.48	.....	22	9	7
September	62	9	33	2.16	.....	21	9	9

TANANA CROSSING.

1904.								
October	53	− 8	18.04	.....	16	10	5	.....
November	.....	−37	.....	.....	20	.....	10	.....
December [a]	.....	−29	.....	.....	13	1	17	.....
1905.								
January	.....	−45	.....	0.24	21	3	7	3
February	.....	−41	.....	1.5	8	4	16	1
March	.....	−19	.....	.10	11	7	13	1
April [a]	.....	2	.....	.....	15	10	3	.....
May [b]	.....	20	.....	.14	14	8	5	.....
June [c]	83	30	.....	.43	15	12	3	4
July	85	30	57.17	.67	15	10	6	8
August	90	32	64.36	2.95	16	9	6	5
September	78	10	41.50	2.80	15	7	8	5

FORT EGBERT. Herman B. Olson, observer.

1905.								
May	75	25	47.3	0.33	9	11	11	6
June	88	33	55.98	1.95	1	9	20	12
July	91	40	64.16	1.52	1	10	20	13
August	82	29	30.56	2.68	.....	20	11	12
September	75	52	47.05	2.43	3	8	19	17

FAIRBANKS. Hudson Stuck, observer.

1904.								
September	62	17	39.4	.....	15	3	9	6
October	52	− 7	29.1	.....	19	2	10	.....
November	28	− 35	− 9.79	.....	21	3	6	.....
December	23	− 47	−12.08	.....	.....	.....	.....	.....
1905.								
January	20	− 48	−16.93	.....	25	.....	6	.....
February	32	− 30	− 5.23	.....	27	.....	1	.....
April	60	6	34.6	2	.....	.....	.....	.....
May	72	22	47.05	.....	13	1	10	.....
June [d]	80	34	28.78	.....	16	.....	7	.....
July	80	18	55.6	.30	13	8	10	3
August	82	30	54.8	2.73	16	4	11	13

[a] Twenty-eight days.
[b] Twenty-three days.
[c] Twenty-five days.
[d] Twenty-seven days.

Meteorological observations—Continued.

FORT GIBBON (Signal Corps). L. M. Hathaway, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy	Cloudy.	Rain or snow.
1904.	° F.	° F.	° F.	*Inches.*				
September				0.35	20	5	5	2
October				.39	16	12	3	2
November				.07	22	5	3	1
December				.06	17	4	10	5
1905.								
January[a]				.04	23	2	6	4
February	35	− 24	44.3	.55	13	6	9	4
May	81	12	48	.84	18	3	10	7
June	78	35	56.05	1.85	16	4	10	15
July	77	32	56.5	5.59	10	4	17	18
August	80	31	52.23	3.23	20	1	10	10

FORT GIBBON (hospital observations). Charles W. Heideman, observer.

1905								
January	32	−44	−2	0.37	16	2	13	2
February	38	−22	6	.47	10	5	13	3
March	53	−26	14		26	4	1	
April	63	7	33	.32	22		8	3
May	81	12	48	.34	15	2	14	7
June	90	32	57.23	1.50	15	3	12	14
July	88	34	56.2	4.90	8		23	17
August	81	28	52.28	3.02	20		11	10

HOLY CROSS MISSION. B. Constantine, observer.

1905.								
May	64	16	41.18		8	4	19	
June	68	32	45.50	0.08	7	15	8	2
July	78	35	53.51	4.89	12	3	16	12
August	71	35	51.62	1.66	10	13	8	5
September	58	17	38.43	1.38	13	4	13	5

KENNICUT MINES, COPPER RIVER VALLEY. Stephen Birch, observer.

1903.								
September	60	18	40.08		22		3	5
October	48	− .1	26.65	1.65	14		10	7
November	44	− .9	3.68	.9	17		11	2
December	32	−10	10.14	2.6	14		9	8
1904.								
January	37	−32	2.88	1.85	12		15	5
February	26	−22	5.34	.65	20		5	4
March	44	−20	12.46	.7	22		5	4

[a] Fourteen days.

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985 Issued June 10, 1907.

ALASKA AGRICULTURAL EXPERIMENT STATIONS.

C. C. GEORGESON, Special Agent in Charge.

ANNUAL REPORT

OF

ALASKA AGRICULTURAL EXPERIMENT STATIONS

FOR

1906.

UNDER THE SUPERVISION OF

OFFICE OF EXPERIMENT STATIONS.

U. S. DEPARTMENT OF AGRICULTURE.

WASHINGTON:
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MAIN LIBRARY AGRIC. DEPT.

ALASKA AGRICULTURAL EXPERIMENT STATIONS, SITKA, KENAI, COPPER CENTER, AND RAMPART.

[Under the supervision of A. C. TRUE, Director of the Office of Experiment Stations, United States Department of Agriculture.]

WALTER H. EVANS, *Chief of Division of Insular Stations, Office of Experiment Stations.*

STATION STAFF.

C. C. GEORGESON, M. S., *Special Agent in Charge, Sitka.*
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P. H. ROSS, B. S., *Assistant at Kenai.*
C. W. H. HEIDEMAN, *Assistant at Copper Center.*

LETTER OF TRANSMITTAL.

SITKA, ALASKA, *February 6, 1907.*

SIR: I have the honor to submit herewith the annual report of the agricultural experiment stations of Alaska for the year 1906.

Very respectfully,

C. C. GEORGESON,
Special Agent in Charge of Alaska Investigations.

Dr. A. C. TRUE,
Director Office of Experiment Stations,
U. S. Department of Agriculture, Washington, D. C.

Publication recommended.
A. C. TRUE, *Director.*

Publication authorized.
JAMES WILSON, *Secretary of Agriculture.*

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ANNUAL REPORT OF ALASKA AGRICULTURAL EXPERIMENT STATIONS FOR 1906.[a]

BRIEF SUMMARY OF WORK.

By C. C. GEORGESON, *Special Agent in Charge.*

SITKA STATION.

The plans outlined in former reports have been followed. That is to say, the work at this station has been along horticultural lines. Sitka Station is the main station only in the sense that it is the headquarters from which the work of the other stations is directed.

Grain growing is no longer attempted here. Our experiments have proved that the coast region is not well adapted to the growing of grain. It will mature in most seasons, but the months of August, September, and October are usually so wet that as a rule it is almost impossible to save the crop. This fact is sufficient to deter farmers from attempting to grow grain except as a forage crop; but aside from this there is in the coast region but little land adapted to the cultivation of grain. The numerous small valleys, coves, and pockets do, however, afford splendid locations for gardens. Our efforts are devoted, therefore, chiefly to the things that are likely to succeed in the region represented by this station, namely, vegetables, berry fruits, and probably some varieties of tree fruits.

Perhaps the most important feature of the work has been the propagating, cultivating, and distributing of nursery stock. There are growing a few trees of each of some thirty varieties of apples, with a view to studying their behavior. For this purpose there have been selected the hardiest varieties known, which at the same time mature their fruit early. Only early maturing sorts will succeed. Varieties which are summer apples in the States will be fall apples in Alaska, and those which are fall apples in the States will not mature at all in Alaska. The summer heat is not great enough. In the coast region the season between frosts is long—longer, indeed, by at least two months than in the northern tier of States.

[a] Previous reports were issued as U. S. Dept. Agr., Office of Experiment Stations Buls. 48, 62, 82, 94, and 169, and Ann. Rpts. 1901, pp. 239–359; 1902, pp. 233–307; 1903, pp. 313–389; 1904, pp. 265–360.

In the larger portion of the coast region there is little, if any, damaging frost between May 1 and October 1, and some seasons damaging frosts do not occur until the end of October. The drawback to the climate in this region lies not in too great cold, but, anomalous as the statement seems, in the lack of summer heat. On the warmest summer day on record at Sitka the thermometer reached 87° F., but this was exceptionally hot. The maximum temperature is more generally between 60° and 70°, and some summers it will not go much above 60°. In the interior, on the other hand, the summers are warm enough, at least in places, but the season is too short to hope to mature any but the earliest sorts, and there is considerable doubt if they will succeed. Details of the growth of the fruit trees which we have attempted to cultivate are given herewith.

Another feature of the work is the propagation and distribution of fruit trees and fruit bushes in order that they may be tested in other parts of the Territory. During the two years 1905 and 1906 there were distributed 6,794 trees and fruit bushes to 312 addresses. This number consisted of 2,716 apples trees in about 30 varieties, 2,204 currant and other fruit bushes, and 1,874 raspberry plants. Records are kept of the persons to whom they are sent, as well as of the varieties sent to each, and in due time a call will be made for detailed reports of the behavior of all of these fruits and plants. It is too early yet to begin to look for results. The writer thinks this distribution of much importance. It is the only means by which extended tests can be made of the adaptability of the different varieties to the conditions of the Territory, as a whole, to the growth of fruits of any kind.

Unfortunately comparatively few trees have been sent to the interior, for the reason that the postal facilities do not admit of the transmission of packages through the mails except during the summer season, when the mails are carried by river navigation, and live trees can not well be sent at that season, especially as they must be in transit for a month or six weeks, but it is expected in time to get a number of trees started in that region also.

There is a native crab apple (*Pyrus rivularis*) in Alaska which may have a possible value as a stock for dwarf trees. It is too small and too slow of growth for standard trees. It grows over a large area in the coast region, in many places forming thickets so dense as to be almost impenetrable. It seldom has a single trunk; usually two or more spring from the same root or branch a few inches above the ground. Its height varies from 10 to 20 feet. It bears its fruit in clusters of little oblong apples which will average smaller than the ordinary sour cherry. Plate I, figure 1, shows a part of a fruiting branch after the leaves have fallen. Small as these apples are, they make a most delicious jelly. A number of varieties of apples have

FIG. 1.—NATIVE ALASKAN CRAB APPLE.

FIG. 2.—CULTIVATED NATIVE ALASKAN STRAWBERRIES.

been grafted on this species by various methods. The crown graft appears, so far, to be the most successful, while top-worked trees do fairly well. Plate IV, figure 1, shows a native crab apple top-worked with the Duchess. This appears to be a standard tree. The writer is of the opinion that dwarf trees of all sorts will do better than standards. They have many advantages—they bear earlier, they can be more easily protected if found necessary, they are not so much exposed to the wind, and a very much larger number can be planted in a given area.

Another line of work which it is hoped may result in good for Alaska is an attempt to develop varieties of strawberries and raspberries adapted to the climate by cross fertilizing cultivated varieties with wild native species. The work is new, and there has not yet been time enough to produce results. The cultivated raspberry has been cross fertilized with the salmon berry (*Rubus spectabilis*). The latter, which is the wild raspberry of the coast region, is hardy, a luxuriant grower, adapted to the sour, peaty soil, and has a large and quite palatable fruit. It resembles the raspberry in appearance, but is lacking in flavor and aroma. The fruit is too soft to permit of shipment, but the berry is very large, and the canes are most vigorous growers. Berries as large and even larger than the end of a man's thumb are not uncommon. (Pl. I, fig. 2.) It is hoped that a cross between this and the raspberry may produce a fruit that will be valuable for the coast region of Alaska and possibly for the interior also. The salmon berry blooms about four weeks earlier than the raspberry, and in order to have the plants of the two species bloom at the same time the raspberry canes were planted in boxes and set in the greenhouse in April. By this means their blooming was forwarded enough to correspond with that of the salmon berry. The work is tedious and takes much time. The raspberry blooms, when about to open, were gone over once or twice a day and the anthers removed, and salmon-berry blooms, taken likewise at the right stage, were carried in and used to pollinate the raspberries. Some plants have been raised from the cross fertilization, but they are still small.

In like manner the cultivated strawberry has been cross-fertilized with the pollen from the wild Alaska strawberry. The cultivated berry plants were removed to the greenhouse in order to hasten the blooming period to correspond with that of the native plants and that there might be full control of the pollination. The cultivated berries used were of a pistillate variety, and the blooms were easily fertilized by the pollen of the native plants. As the berries thoroughly ripened the seeds were separated from the pulp and dried. These seeds were planted in flats last fall (1905), remaining out of doors until after thoroughly freezing, when they were removed to the forcing house.

Plate II, figure 2, shows part of the cultivated plants in the boxes in the greenhouse which have been subjected to pollination. The well-formed, regular berries prove that the work was a success. Berries of the same variety grown out of doors without artificial pollination were quite generally deformed and irregular, owing to imperfect pollination.

THE NATIVE ALASKA STRAWBERRY.

It is an interesting fact that there are at least two species of wild strawberries in Alaska, one in the coast region and one in the interior. They differ greatly from each other. That on the coast is a large, vigorous plant, the berries often as large as thimbles, while the species in the interior is a small, smooth plant, with very small berries, the size of peas.

The coast species (*Fragaria* sp.) is found in abundance on the bleak coast from Muir Glacier to Mount St. Elias. It grows in almost pure sand and gravel and disputes the ground with the mosses, grasses, and other plants peculiar to the region. It usually bears fruit in abundance, though some seasons the crop is short. From August 2 to 10, 1906, a party of people from Juneau camped at Point Gustavus, on Glacier Bay. They gathered over 100 gallons of these wild strawberries, which were carried home and preserved by the various arts of the housekeeper. A couple of years ago we procured from Yakutat Beach 150 plants of this berry, which were set out in good garden soil and given the usual culture. The plants grew and propagated with extraordinary luxuriance, but did not produce a single berry. They had been fed on sand and watered by the spray of the sea, and they now made the most of it when put in good soil. Their cultivation came near being abandoned as a failure. A further experiment was made, however, by planting a few hundred plants in some of the poorest soil that could be found. It is a sterile, volcanic sand, and will produce absolutely nothing unless it is fertilized. There these native strawberries felt at home and began to bear fruit. Plate II, figure 1, is a plant in this patch. The leaves were drawn aside for the purpose of exposing the berries to the camera. Attention is called to the fact that the peduncles are short and prostrate, and the berries not only lie on the ground, but bury themselves in it. While in bloom some of them are upright, but these are usually sterile; the fertile flowers lie on the ground.

In going through the patch the casual observer will see no fruit. He must pull aside the tangle of leaves and runners to see the berries. The plants, even on this sterile ground, are vigorous and produce a mass of runners. The leaves are large, on long petioles, woolly, and rather coarse, and a peculiarity which the writer has never seen before either among cultivated or wild strawberry plants is that a very large

FIG. 1.—NATIVE ALASKAN STRAWBERRY UNDER CULTIVATION.

FIG. 2.—CULTIVATED STRAWBERRIES, FERTILIZED FROM NATIVE SPECIES.

pound of seed, which was planted in flats in the propagating house. Efforts to bring the species under cultivation will be continued.

There are two species of the black currant which grow plentifully on the islands, but which are rare on the mainland. They are *R. bracteosum* and *R. parviflorum;* both have large and palatable berries and fruit abundantly. No trouble has been experienced in introducing them; they are at home in the region about the station and will grow anywhere, but whether they will be an improvement over varieties now under cultivation remains to be determined by further work.

CRANBERRIES.

After several unsuccessful attempts to make the eastern cranberry grow here, it has been concluded that to experiment further in that line is useless. The so-called Alaska cranberry (*Vaccinium vitis-idæa*) produces a small but very delicious fruit, no larger than a small red currant. The whole plant is of miniature dimensions, stems being only from 4 to 6 inches high. It grows abundantly in the marshes and among the mosses and in wet ground. It does not grow in standing water or even where water occasionally stands, but will grow on old stumps and decayed logs and on little knolls where it is just out of the standing water. The plant has been transferred to the station and planted in rows, which, however, are not cultivated. It thrives and yields fruit like the wild berry in the bogs.

ENLARGEMENT OF THE PROPAGATING HOUSE.

It was noted in the last report that a small propagating house had been built at the Sitka Station. It is a simple lean-to, only 20 feet long. It very soon proved to be much too small to accommodate the propagating work; an addition has therefore been built to it 20 feet long, so that the house now measures 40 feet. It is already full and more room will be needed in the near future.

ATTEMPTS AT BEEKEEPING.

In 1905, with a view to testing the practicability of keeping bees in southeastern Alaska, two stands of bees were procured, through the Bureau of Entomology, from a beekeeper in the State of Washington. The bees were not strong when received, but in a good bee country they would probably have survived and increased. They arrived in June and at once set to work on their search for honey; but as there are not many honey blossoms at that season of the year it soon became apparent that they would have to be fed. From the beginning of August until fall they were fed on a sirup made from granulated sugar. In the early part of November they were removed to a frost-proof cellar. In the spring they were found to be dead.

Some years ago a priest of the Russian Church made a similar experiment on a larger scale, with the same results. Beekeeping can not be made a success in southeastern Alaska.

OFFICE WORK.

The office work is constantly increasing in volume. It is no unusual thing to receive fifty letters in a mail, many of which require extended answers. In addition to this, the correspondence in connection with the weather service and the work as disbursing agent demand nearly all the time of the special agent in charge. The office has never been provided with a permanent clerk. Help for office work has been hired at times, but it is difficult to get competent help. The time has arrived when it will be economy to provide the office with a permanent clerk, in order that the special agent in charge may have more time for experimental work.

COPPER CENTER STATION.

It is with much regret that report is made that Mr. J. W. Neal, who has been superintendent of the Copper Center Station since July 1, 1902, has resigned from the service, his resignation to take effect January 31, 1907. Mr. Neal has been an exceptional man for this trying place. His wife and little child remained at the station for more than four years and were subject to the hardships to which an isolated settler is exposed in that rigorous climate. Mr. Neal has accomplished an enormous amount of work and has done most of it with his own hands, seldom having more than one man to help him. He has cleared and brought under cultivation 40 acres of land and fenced 80 acres of pasture aside from the cultivated land, built a log house, cache, root cellar and shed, blacksmith shop, tool house and barn, and carried out a large number of experiments with grains and vegetables. Eleven acres have been seeded to various species of grass to test their behavior. The labor and hardships connected with hauling a year's supplies each winter over the trail, 105 miles from Valdez, have been detailed in a former report. His report of the season's work is submitted herewith.

Only a small percentage of the grains at the Copper Center Station matured, and that which did mature was sowed in small plats with the earliest seedings. When upward of 30 acres has to be seeded to many varieties and in many plats, with but one team of horses, progress must necessarily be slow, and the later seedings stand but a small chance of maturing before frost. This is what happened the past season. Owing to the dry weather the growth had been slow up to the middle of July, but from that time until the last of August rains were more frequent, and the grain continued

to grow later than usual. The result was that when killing frost appeared on August 24 the grain was still in a growing state and all but the earliest seeded plats were spoiled for seed. The frosted grain, however, was immediately cut for hay, and 20½ tons of this has been sold for a total of $4,152, the price per pound ranging from 7 to 12 cents, according to quality.

These results prove that grain hay can be successfully grown in the interior and that in a location like Copper Center, 100 miles from tide water, good prices can be realized. This grain had not been seeded with a view to growing hay. For that purpose larger growing varieties would have produced a heavier yield and brought a larger profit.

What has been done by the station in this instance can be done equally well and with probably greater profit by any private individual who has the means and the energy to break up a piece of ground and to seed it with oats as a hay crop. If anyone should try, it is recommended that he select a large growing variety and sow from 90 to 100 pounds of seed to the acre. There is but little feed produced in the interior; that for all the horses used in the pack trains and for those used by travelers must be hauled in from tide water, and the price realized represents very largely the cost of transporting it to points where it is wanted. As a matter of fact, $200 a ton for hay is a low price under the circumstances. It would cost more than that to haul a ton over the trail 100 miles from Valdez. Road-house keepers are advertising hay at 20 cents per pound as an especially low rate. The ordinary retail price at that distance from tide water is 25 cents per pound, or $500 per ton.

RAMPART STATION.

It is a somewhat remarkable fact that grain has matured every year at the Rampart Experiment Station since work was begun there in 1900, while at the Copper Center Station, 3½ degrees farther south, only one satisfactory crop has matured during the four years we have been at work there. At the latter place killing frosts have occurred in August—in one year as early as August 14—while at Rampart no killing frosts have occurred before the grain ripened, in the latter part of August. The past season frost did not occur until the beginning of September. We can simply note this fact without attempting to explain the cause. The superintendent of the Rampart Station, Mr. Frederick E. Rader, like Mr. Neal, has done most of the work himself. From July 1 until the close of fall work he has had one man to help him. No additional land has been cleared the past season. He has had his hands full in attending to the crops on that which was already cleared. He has

built a five-room cottage, 28 by 30 feet, upon high ground beyond the reach of floods. The log cabin which has until the present time served as a residence for the superintendent is located on the river bank, and during the spring freshet this cabin has been flooded. Last June the water was 30 inches deep inside, and of course it had to be abandoned for a tent. Mr. Rader has also built a combined log barn and implement shed, 30 by 30 feet. Through the courtesy of the United States Geological Survey, the Rampart Station has been so fortunate as to get a fairly good team of horses without expense. Mr. D. C. Witherspoon, who was in charge of one of the Geological Survey parties in that region, closed the season's work with a number of pack horses on his hands, for which there was no market. He therefore kindly turned the best two horses over to the Rampart Station. Our thanks for this generosity is hereby extended to Mr. Witherspoon and to Mr. Alfred H. Brooks, chief of the Alaska division of the Geological Survey.

A stump puller and a plow have been added to the station equipment, and it is hoped that next year the area under culture may be increased to 10 or 12 acres.

The list of varieties of grain grown there the past season is short, for the reason that a shipment of seed grain ordered sent in during the summer of 1905 failed to reach the station, and was therefore not on hand for spring seeding in 1906. It is a decided disadvantage to the work that everything required by the station must be sent in the year before it is wanted.

A brief detailed report by Mr. Rader is submitted herewith. Special attention is called to the fact that three varieties of winter rye and one of winter wheat lived through the winter and matured grain, although the temperature fell to 70° below zero. They are Amber Winter rye, Giant French Winter rye, and Excelsior Winter rye. The winter wheat is a variety imported from Russia and known as "Kharkov Winter wheat." It is not to be expected that winter grain will always survive. Last year conditions were favorable in that there was a good covering of snow, which fell before severe freezing weather set in.

Of the spring grains, the following varieties matured: Manshury barley, Lapland barley, Two-Rowed barley, Burt Extra Early oats, Finnish Black oats, and a portion of the crop of a variety of Russian buckwheat.

The season was wet for that region, and the spring grains showed a tendency, which has also been observed here at Sitka, of sending out fresh shoots from the roots late in summer. This late growth could not mature and was a detriment to the crop.

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DEVELOPMENT OF EARLY VARIETIES.

One of the lines of experiment which have been begun and which will be followed with scrupulous care is the development of early maturing strains of the grains under cultivation by a process of selection. To this end the crops are carefully watched, and the earliest maturing heads are cut and then labeled with the date of maturity and their characteristics studied. The seed from these early heads will be planted on specially prepared seed beds, and the individual plants watched with a view to noting their desirable qualities. The earliest maturing heads will, in like manner, be selected from these, and those among them which possess other valued qualities will be preserved for propagation in the same manner. By these means it is hoped that varieties which will make rapid growth and mature before crops raised from seed grown farther south may eventually be secured. This work will be carried on more particularly at the Rampart and Copper Center stations.

It will be noted from Mr. Rader's report that the hardy vegetables were a success. Special attention is called to a fact which he states very briefly, namely, that potatoes which were sprouted in a warm place and planted with special care so as not to break the sprouts "came up soonest, grew the largest and the most mature potatoes, and produced nearly twice as much as those planted in the ordinary way."

In the interior, where potatoes are worth from 10 to 15 cents per pound, it is well worth giving extra care to the crop. Potatoes have been grown and wintered successfully both at the Copper Center and Rampart stations.

KENAI STATION.

Work at the Kenai Station has been devoted wholly to growing feed for live stock, to testing some of the grasses and forage plants, and to dairy work. There are 26 acres under cultivation at this station, all of which has been reclaimed from the forest. Grains have not matured satisfactorily in this region in former years, and therefore any attempt to grow grain has been given up except for hay. Nearly the whole area was seeded to oats, which was cut for hay in the latter part of August and the early part of September.

Aside from this, the superintendent, Mr. P. H. Ross, has devoted his time to the manufacture of butter and cheese on a small scale. The object is to ascertain if dairying can be made a success in that region when cattle are fed wholly on feed grown there. With this end in view, the station was provided with a modest equipment of dairy apparatus. The chief piece of machinery is a small hand separator. A small barrel churn with a capacity of 15 gallons has

proven satisfactory. A hand butter worker, a Babcock 12-bottle milk tester, and a small cheese vat and press with the necessary accessories complete the outfit. The whole equipment cost $150 at point of shipment. It was selected with the idea that it would meet the demands of a small farm dairy, such as might be established in Alaska in many places, and the results have proven that it answers these requirements. The outfit is sufficient to handle the milk from about 12 or 15 cows. If much cheese is to be made, however, a larger cheese-making apparatus should be chosen. The one purchased for the station is too small for commercial purposes.

The cows in milk averaged only three head most of the time, and they are not first-class dairy cows. Their milk was, however, made into butter and cheese enough to supply local demand for these articles. The butter has been especially good. It was made into 1-pound prints, and these were wrapped in paraffin paper. That which was not sold promptly was preserved in brine. For a short period it will keep very well that way, but if kept more than two months it begins to deteriorate. When the writer visited the station in the latter part of July he made up a package of butter and cheese, which was forwarded to Washington. Although on arrival at the Department, during an exceedingly hot spell, the butter was almost oily, the natural consistency was restored by placing it for a few days in cold storage. Both the butter and cheese were pronounced very good.

During the open season the cattle run at large and live exclusively on the native grasses, which are sweet and nutritious. The cattle are maintained in excellent condition, and this experiment would indicate that this native food is also well adapted for dairying.

There are extensive areas of wood pasture throughout the Kenai Peninsula which can be utilized by dairy farmers should they choose to locate there. There are no extensive meadows, except in some stretches of lowland along the coast of Cook Inlet, and the swamp grass in these regions does not make the best feed. The higher land is very largely wooded with spruce, birch, alder, and bushes of many kinds. These woods are open in many places, and in other places there are little patches of meadow where but few or no trees grow, and it is these open woods that afford the pastures. There are but small areas that can be mowed; here and there are patches of from 5 to 40 acres which can be mowed for hay, but as a rule land will have to be cleared and leveled before a mower can be run over it.

There is one important feature which should be mentioned in this connection, and that is that there is at present no local market of any consequence in the peninsula. Dairy products would have to be shipped to towns and settlements along the coast, where they would

come in competition with dairy produce shipped up from Puget Sound, and owing to the fact that the coastwise traffic is irregular and inadequate the freight charges on small local shipments would probably be as great or greater than freight charges on larger shipments from Puget Sound to the same points. When railroads are built so that the mining camps in the interior can be reached prospective dairy farmers in the Kenai Peninsula and elsewhere in the coast region will have better markets for their products than are at present available.

Mr. Ross's report, which is submitted herewith, details at some length the growth of the grasses which he has under experiment, and also touches on the efforts at gardening which were made at the station the past season.

ADDITIONS TO BUILDINGS.

Some inexpensive additions were made to the station buildings in August last. A wood shed, 8 by 14 feet, was added to the log house which serves as the superintendent's dwelling. This was made necessary because the shed which was there was converted into a dairy room. A blacksmith shop, 14 by 20 feet, was built, and an implement shed, 14 by 20 feet, was erected against the side of the barn for the shelter of the implements. Both of these were put up so that the tools and implements could be moved from the barn floor and the space thus gained utilized for the storage of hay. The framework of these additions was made of poles cut in the woods, and the roof and siding were made of damaged tin obtained from the ruins of the Kusillof cannery, which was burned.

INTRODUCTION OF GALLOWAY CATTLE.

The appropriations for the fiscal years 1906 and 1907 each carried $3,000 to be expended in experiments with live stock in Alaska. For these experiments it was deemed best to select a hardy breed of cattle which should be well adapted to the climatic conditions of that far northern region. The Galloway breed was selected for that purpose. West Highland cattle are undoubtedly equally hardy, but there are so few of them in America that the prices for fine individuals run very high; moreover, they are rather wild by nature and have long, heavy horns, facts which would handicap experiment stations in handling then. Galloways have no horns. They have a thick coat of hair, and docile, tractable animals can readily be obtained. So, all things considered, the Galloway was deemed the best breed for the purpose. Eleven head—two bulls and nine females—were purchased and sent to Alaska. One of the bulls was imported from Scotland as a yearling. These cattle were bought from

FIG. 1.—IMPORTED SIR HENRY OF LOCHSIDE, KENAI STATION.

FIG. 2.—LEWANDA AND CALF, ALASKA MAID, KENAI STATION.

Pacific coast region, which contain a large percentage of Jersey blood. It is hoped that in a very few years the station may have Galloway cattle for sale for breeding purposes at a reasonable price, so as to enable settlers in Alaska to obtain acclimated stock.

Still another object in view is to develop an all-purpose breed from the Galloway. This will require some time. The Galloway has been bred chiefly for beef. It is a low, blocky animal of the beef type. Some of the breed are fairly good milkers, but as a rule they have not been used for dairy purposes. Settlers in Alaska will need a cow which will be a fairly good milker as well as a good beef producer, and it is planned to develop the dairy quality to a certain degree by selection and breeding without destroying the other characteristics which make the breed desirable for Alaska, namely, its heavy coat of hair, its hardy nature, and its ability to rustle. There are comparatively few cattle in Alaska now. Those which are kept in the towns are fed chiefly on imported feed and are kept for the purpose of supplying the local market with milk; but few homesteaders keep cattle of any kind. It is hoped, by rendering Galloway bulls available, a race of grades may be developed which may in large measure have the hardiness of the Galloways.

Nor are the live-stock experiments to be limited to cattle. It is planned to import at least one hardy breed of sheep as soon as money is available for that purpose and provision made for their care. The breed should be selected with a view to hardiness. The Blackfaced Scotch would answer the purpose well, and perhaps it might be possible to import a small flock from Iceland. What is required is a sheep with pronounced hustling qualities which can withstand a severe climate and is as nearly exempt from disease as possible.

A LIVE-STOCK BREEDING STATION.

It is planned to establish a live-stock breeding station at some point which can be reached without difficulty and where feed is abundant and the stock can run out nearly the year round, so that little winter feeding will be required. Kodiak Island, perhaps, more nearly answers these requirements than any other point in Alaska, and it is therefore hoped that it may be possible to start a breeding station at some suitable point on that island. Some buildings are necessary. In addition to barns and sheds there should be a cottage or two for the superintendent and his assistant, and a dairy building for the further prosecution of that branch of the industry. The cattle, which are to be purchased the coming spring, should be located there, and so should the cattle which are now at Wood Island and the Kenai Station, so as to cencentrate the work in that line in one place for the sake of economy and efficiency.

NOTES ON NURSERY STOCK, SITKA STATION.

APPLES.

DWARF TREES IN BREWERY LOT.

Sweet Bough: June 1, three trees in good condition. July 1, 6 inches new growth. August 1, somewhat affected by leaf fungus; sprayed with Bordeaux mixture. September 1, 18 inches new growth. October 1, average growth 18 inches; one tree 2 feet. New growth very tender.

Tetofsky: June 1, three trees doing well. July 1, 5 inches growth. August 1, sprayed for leaf fungus. September 1, very thrifty; 15 inches growth. October 12, average growth 18 inches.

Golden Sweet: June 1, three trees in excellent condition. July 2, thrifty, 1 foot growth. September 1, 2 feet growth. October 12, average growth 27 inches; tips very tender.

Primate: June 1, two trees in good condition. July 2, 6 inches growth. September 1, 2 feet growth. October 12, average growth 27 inches; tips very tender.

Early Harvest: June 1, in good condition. July 2, growth short; thrifty appearance. September 1, 18 inches growth. October 12, average growth 2 feet; new growth very tender.

Fanny: June 1, three trees in fine condition. July 2, unthrifty. September 1, 15 inches growth. October 12, average growth 18 inches.

Keswicks Codlin: June 1, three trees in good condition. July 2, growth short; thrifty looking. September 1, 15 inches growth. October 12, 2 feet growth; very tender.

Yellow Transparent: June 1, three trees in fine condition. July 2, 4 inches growth. September 1, 2 feet growth. October 12, 27 inches growth; tips of new growth very tender.

Red Astrachan: June 1, three trees in good condition. July 2, growth short. September 1, 14 inches growth. October 12, 18 inches growth.

STANDARD TREES.

Fanny: June 1, five trees in fair condition. July 2, not doing well. September 1, 12 inches growth; appears unthrifty. October 12, average growth 15 inches.

Golden Sweet: June 1, five trees in good condition. July 2, 4 inches new growth. September 1, 15 inches growth. October 12, 2 feet growth; very tender.

Sops of Wine: June 1, five trees not in good condition. July 2, not doing well. September 1, 12 inches growth; unthrifty. October 12, 15 inches growth; unthrifty.

Summer Rose: June 1, five trees in poor condition. July 2, no new growth. September 1, unthrifty; 8 inches growth. October 12, unthrifty.

Sweet Bough: June 1, five trees in good condition. July 2, 6 inches new growth. September 1, 15 inches growth; thrifty. October 12, strong; 2 feet growth.

Early Strawberry: June 1, five trees in good condition. July 2, thrifty; 6 inches growth. September 1, 12 inches new growth; rather unthrifty. October 12, unthrifty; 15 inches growth.

Primate: June 1, five trees in good condition. July 2, 5 inches growth. September 1, 18 inches growth. October 12, 2 feet growth; thrifty; tips very tender.

Williams Favorite: June 1, three trees in fine condition. July 2, 6 inches growth. September 1, 15 inches strong growth. October 12, 18 inches growth.

Benoni: June 1, five trees in good condition. July 2, 6 inches growth. September 1, two trees doing well; 15 inches growth. October 12, two trees average growth 2 feet; others 14 inches.

NOTE.—These trees were sprayed three times with Bordeaux mixture for leaf fungus. The new wood is very soft, too tender to withstand freezing. The leaves were stripped off October 10 to check the growth, that the new growth might harden. All are young trees, and none of them have shown blossoms or fruit.

APPLES ON STATION GROUNDS.

Duchess: May 1, fourteen trees; poor condition; buds swelling. May 15, nearly full leaf. June 1, give little promise. July 1, very little growth. September 1, making no growth. October 1, very poor condition.

Martha: May 1, seventeen trees; buds swelling. May 15, buds opening. June 1, very backward. June 15, eight trees give promise; very little growth. September 1, eight trees growing some. October 12, in poor condition.

Hibernal (block 1): May 1, seven trees; good condition. June 1, starting nicely. July 1, very thrifty appearance. July 15, 4 inches growth. September 1, 12 inches growth. October 12, good condition.

Whitney: May 1, seventeen trees; good condition; buds opening. May 15, nearly full leaf. June 15, 3 inches growth. September 1, average new growth 18 inches. October 12, good condition.

Red Astrachan: May 1, fifteen trees; good condition. May 15, full leaf. June 1, 2 inches growth. September 1, all trees unthrifty. October 12, little growth; poor condition.

Lowell: May 1, fair condition. May 15, very backward. June 1, growing slowly. July 1, not doing well. July 15, gives promises. September 1, doing well; 10 inches growth. October 12, good condition.

Tetofsky: May 1, twenty trees; fair condition. May 15, nearly full leaf. June 1, good color; no growth. July 2, rather backward. September 1, appearing thrifty, but have made no growth. October 12, same condition.

Yellow Transparent: May 1, eighteen trees; good condition. May 15, full leaf. June 1, very little growth. July 15, 3 inches growth. September 1, average new growth 15 inches; thrifty. October 12, good condition.

Eureka: May 1, fourteen trees; good condition. May 15, nearly full leaf. June 1, rather backward. July 1, gives some promise. September 1, all look well; average growth 14 inches. October 12, fair condition.

Sylvan Sweet: May 1, sixteen trees; good condition. May 15, in full leaf. July 15, thrifty; short growth. September 1, average new growth 12 inches. October 12, good condition.

Byers Sweet: May 1, eight trees; poor condition; buds swelling. May 15, nearly full leaf. June 1, backward. July 1, unthrifty. September 1, no growth. October 12, poor condition.

Raspberry: May 1, eighteen trees; good condition. May 15, full leaf. July 15, 3 inches growth. September 1, 15 inches growth. October 12, good condition.

Red June: May 1, fifteen trees; fair condition. June 1, rather backward. July 15, 2 inches growth. September 1, 12 inches growth. October 12, good condition.

Maiden Blush: May 1, five trees; fair condition. July 1, rather backward. July 15, two trees growing. September 1, two trees each made 12 inches growth. October 12, but two trees in good condition.

Early Harvest: May 1, sixteen trees; seven in good condition. June 1, unthrifty. July 1, very little growth. September 1, seven have made average growth of 12 inches. October 12, seven in good condition.

Patten: May 1, seven trees; good condition; buds swelling. June 1, very thrifty. July 15, 3 inches growth. October 12, in fine condition, except that the new growth is tender.

Jessie: May 1, seven trees; fair condition; buds opening. June 1, very backward. July 1, promises but little. September 1, very little growth. October 12, poor condition.

Hibernal (block 2): May 1, seven trees; good condition; buds opening. July 1, thrifty. July 15, 2 inches growth. September 1, 12 inches growth. October 12, poor condition.

Peerless: May 1, seven trees; good condition; buds opening; June 1, doing nicely. July 15, 3 inches growth. September 1, 15 inches growth. October 12, very good condition.

Yellow Transparent: May 1, two trees; fine condition; buds well advanced. July 1, making vigorous growth. July 1, one tree in bloom; no fruit set. September 1, 2 feet growth. October 12, in good condition.

Duchess (block 2): May 1, eight trees; fair condition; buds swelling. July 1, look thrifty; growth short. September 1, very little new growth. October 12, trees in fair condition.

Red June: May 1, four trees; fair condition; buds swelling. June 1, very thrifty. July 15, 3 inches growth. September 1, 15 inches growth. October 12, good condition.

Hyslop: May 1, five trees; good condition; buds well advanced. July 15, very thrifty; 4 inches growth. September 1, 2 feet growth. October 12, new wood very tender, otherwise good condition.

Transcendent: May 1, two trees; good condition; buds well advanced. May 15, full leaf. July 1, very thrifty. July 15, 6 inches growth. September 1, 12 inches growth. October 12, good condition.

NOTE.—These trees were sprayed once in June, twice in July, and once in August with Bordeaux mixture for leaf fungus. The leaves were stripped off October 10, in order to check the new growth and harden the new wood. Last winter, that of 1905–6, was a severe one; the temperature fell to 2 below zero, which is the lowest it has been for about sixty years. The mild moist weather the preceding fall caused growth to be prolonged unduly, and the tender wood was killed back in most cases from 4 to 6 inches. The same will be the case whenever the temperature approaches zero. To assist in maturing the wood, the leaves were stripped from these trees early in October.

APPLE TREES GRAFTED AT THE STATION, 1904.

Lowell, whip graft on native crab-apple stock: May 1, two trees; good condition; buds opening. May 15, in full leaf. July 1, very thrifty. July 15, 4 inches growth. September 1, 12 inches growth.

Lowell, crown graft on native crab apple: May 1, four trees; good condition; buds opening. July 15, 4 inches growth. September 1, average growth 9 inches.

Duchess, topworked on native crab apple: May 1, one tree; good condition; buds opening. May 15, full leaf. July 1, 6 inches growth. September 1, 18 inches growth. October 12, good condition.

Duchess, whip graft on native crab-apple stock: May 1, fair condition; buds opening. July 1, not doing well. September 1, 1 foot spindling growth. October 12, not in good condition.

Okabena, topworked on native crab-apple stock: May 1, one tree; good condition; buds opening. July 1, very thrifty. July 15, 4 inches growth. September 1, 15 inches growth. October 12, in good condition.

Okabena, whip graft on native crab-apple stock: May 1, fair condition. July 15, 3 inches growth. September 1, 9 inches growth. October 12, good condition.

Minnesota, whip graft on native stock: May 1, fair condition. July 15, 4 inches growth. September 1, 9 inches spindling growth.

Jewett, whip graft on native stock: May 1, fair condition. July 15, spindling; 3 inches growth. September 1, 6 inches growth. October 12, poor condition.

Whitney, whip graft on native stock: May 1, fair condition. July 15, spindling; 3 inches growth. September 1, 6 inches growth. October 12, poor condition.

Walbridge, whip graft on native stock: May 1, in fair condition. July 15, spindling; 4 inches growth. September 1, 6 inches growth. October 12, poor condition.

North Star, whip graft on native stock; May 1, poor condition. July 15, 5 inches growth. September 1, 8 inches growth. October 12, poor condition.

NEW GRAFTS, 1906.

Seven hundred trees of five varieties: June 1, made good start; ravens destroyed a few. August 1, 98 per cent doing nicely. September 1, made good growth. October 12, heeled in for distribution in the spring.

Apple seedlings: May 21, set in nursery row. July 2, all growing slowly. September 1, short but thrifty growth. October 10, three thousand heeled in for stock on which to graft.

Pyrus baccata: May 1, fourteen trees; good condition; buds opening. July 15, growing nicely. September 1, average growth 12 inches.

Juneberry: May 1, good thrifty condition. July 1, growing nicely; in bloom. July 15, 6 inches growth; well set with fruit; yet blooming. August 15, fruit ripening; rather small. September 1, fruit ripe; new growth average 18 inches. October 12, splendid condition.

YEARLING APPLES SET IN NURSERY ROWS MAY 14.

Greenwood Crab: May 21, one hundred trees; good condition. July 1, doing nicely. September 1, 18 inches growth. October 10, heeled in for distribution in spring of 1907.

Yellow Siberian Crab: May 1, one hundred trees in good condition. July 1, doing nicely. September 1, 2 feet growth. October 12, heeled in for distribution.

TWO-YEAR-OLD APPLE TREES SET IN NURSERY ROWS.

Early Strawberry: Three hundred and fifty trees set. September 1, all trees growing; average growth 15 inches. October 11, heeled in for distribution.

Whitney: May 18, three hundred and fifty trees set. September 1, all growing; average growth 15 inches. October 11, heeled in.

Beecher Sweet: May 18, thirty-six trees set. September 1, not doing as well as other varieties; average new growth 8 inches.

Dart: May 18, fifty trees set. September 1, very thrifty; 18 inches growth. October 11, heeled in.

Orange: May 18, two hundred and ninety trees set. September 1, few trees died; others doing nicely. October 11, heeled in.

Transcendent: May 18, set in nursery rows. September 1, all trees lived, making an average growth of 18 inches. Left in nursery row.

FIG. 1.—APPLE GRAFTED ON NATIVE CRAB APPLE IN SITKA NURSERY.

FIG. 2.—THREE-YEAR-OLD CHERRY TREE IN SITKA NURSERY.

CHERRIES.

English Morello: May 1, eight trees; good condition. May 15, buds nearly open. July 1, in bloom. July 15, petals falling; about 20 per cent of bloom set fruit. August 10, fruit ripe; many cherries deformed (Pl. IV, fig. 2). September 1, 2 feet growth. October 12, tips of new wood very tender.

Ostheim: May 1, fourteen trees; good condition. June 1, thrifty. July 1, in full bloom. July 15, 6 inches growth; fruit well set. August 5, fruit ripe; fair condition. September 1, average new growth 15 inches. October 12, new wood not so tender as English Morello.

Early Richmond: May 1, nineteen trees; good condition. June 1, very thrifty. July 1, in full bloom. July 15, about 40 per cent of bloom fertilized. August 1, fruit ripe; some cherries deformed. September 1, new growth 2½ feet. October 15, very tender.

Dyehouse: May 1, nineteen trees; good condition. June 1, growing nicely. July 1, full bloom. July 15, 4 inches growth; fruit well set. July 23, fruit well ripening. August 5, fruit ripe; some deformed. September 1, 2½ feet growth. October 12, new wood very tender.

Sand cherry: May 1, six bushes; good condition. June 1, rather backward in starting growth. July 15, thrifty; in bloom. August 1, no fruit set. September 1, look thrifty; 10 inches growth. October 12, good condition.

PLUMS.

May Day: May 1, three trees; tips winterkilled. May 15, buds opening. July 1, two trees very thrifty; others not doing well. August 1, 10 inches growth. September 1, new growth, 15 inches. October 12, new wood very tender.

Tomahawk: May 1, one tree; fair condition. June 1, not making growth; looks thrifty. September 1, new growth, 3 inches. October 12, good condition.

Sayles: May 1, two trees; fair condition; tips winterkilled. June 1, not doing well. August 1, growing nicely. September 1, 18 inches growth. October 12, new wood very tender.

Wyant: May 1, two trees; fair condition; tips winterkilled. June 1, very backward. July 1, growing nicely. September 1, 18 inches growth. October 12, new wood very tender.

Hawkeye: May 1, two trees; fair condition; tips killed by frost. June 1, not doing well. July 1, making good growth. September 1, 18 inches new growth. October 12, new growth very tender.

Forest Garden: May 1, two trees; poor condition. June 1, very backward. July 1, making some growth. September 1, 15 inches growth.

De Sota: May 1, poor condition; four trees; badly injured by frost. June 1, very backward. August 1, making some growth. September 1, new growth very short. October 12, fair condition.

Rollingstone: May 1, one tree; fair condition. June 1, rather slow in making growth. July 1, making some growth; looks thrifty. September 1, 12 inches growth. October 12, good condition.

Siont: May 1, one tree; fair condition. June 1, growing nicely. July 15, in bloom. August 1, no fruit set. September 1, 8 inches growth. October 12, good condition.

Red June: May 1, one tree; bad condition. June 1, very unthrifty. August 1, very poor. September 1, bad condition.

Aitkin: May 1, eleven trees; fair condition. June 1, very backward. August 1, three thrifty trees. September 1, seven trees alive; three thrifty, making 15 inches new growth.

Prunus besseyi: May 1, fifty trees; fair condition; tips winterkilled. June 1, making some growth; look thrifty. September 1, 8 inches growth. October 12, good condition.

Odegaard: May 1, six trees; fair condition. June 1, doing nicely. August 1, thrifty growth. September 1, 2 feet growth. October 12, new wood very tender.

Seedling Americana: May 1, one hundred trees; fair condition. July 1, making thrifty growth. August 1, few leaves affected by fungus. September 1, 2 feet growth. October 12, new wood rather tender.

Seedling of Cherry plum: May 1, eighty trees; most all in good condition. June 1, doing nicely. July 1, thrifty; 4 inches growth. September 1, 2½ feet growth. October 12, new wood very tender.

Seedling of Wyant: May 1, twenty trees; good condition. June 1, doing nicely. August 1, making vigorous growth. September 1, 2 feet growth. October 12, good condition.

BUSH FRUITS.

High-bush cranberry: May 1, in fair condition. June 1, very backward. August 1, looks thrifty; very little growth. September 1, 6 inches growth; good condition.

Buffalo berry: May 1, in fair condition. June 1, very backward. August 1, making but little growth. September 1, very poor condition.

Sand cherry (Western): May 1, good condition. June 1, in full leaf. August 1, thrifty growth. September 1, 8 inches growth. October 12, good condition.

CURRANTS.

Native currant from Sunrise: June 1, bad condition. August 1, making no growth. September 1, nearly dead.

Red Cross: June 1, in leaf; thrifty. July 1, in bloom. July 15, fruit well set. July 23, fruit ripening. August 10, fruit picked; berries large; excellent quality. September 1, 2 feet new growth.

Black Champion: June 1, well advanced. June 15, in bloom. July 1, some fruit set. August 18, fruit picked; fruit large; excellent quality.

Lee Prolific: May 15, in leaf. June 15, in bloom. August 20, fruit picked; berries medium; clusters small; excellent quality. September 1, new canes 2 feet long.

Wilder: May 15, in leaf. June 15, in bloom. July 1, very little fruit set. August 15, fruit eaten by robins. September 1, 3 feet new growth.

Russian Black: May 15, vigorous. June 1, in bloom. June 15, very little fruit set. August 20, fruit picked; berries small; quality poor. September 1, 3 feet canes.

Ruby Castle: June 1, plants look thrifty; makes no growth. September 1, 18 inches growth; not vigorous.

Common Red: June 1, very backward; in bloom. June 15, very little fruit set. August 15, fruit taken by robins. September 1, poor condition.

Black currants: June 1, good condition. June 15, in bloom. July 15, no fruit set. September 1, 3 feet new growth; very tender.

Native currant: June 1, well advanced. July 15, not looking vigorous. September 1, 18 inches new growth.

Amber-Colored: June 1, good condition. June 15, making good growth; does not appear vigorous. September 1, 3 feet new growth.

Victoria: June 1, well advanced; in bloom. June 15, fruit well set. August 20, fruit picked; berries medium size; clusters loose; quality excellent. September 1, 18 inches growth.

Crandall: June 1, well advanced. September 1, 2 feet new growth.

Fay Prolific: June 1, poor condition. August 1, making growth; not vigorous. September 1, very little growth; poor condition.

White currant: June 1, growing nicely; in bloom. June 15, fruit poorly set. August 20, fruit picked; berries small; good quality. September 1, 18 inches new growth.

Currant cuttings of various varieties, 2,000 plants: September 1, top growth very short; root system well developed.

RASPBERRIES.

Turner: June 1, canes badly injured by freezing. July 1, in bloom. August 10, fruit ripe; berries small. September 1, new canes 3 feet long; fruit yet ripening.

Fuller Colorado: June 1, tips of capes winterkilled. June 15, blooming August 10, first ripe fruit. September 1, new growth 4 feet.

Miller Favorite: June 1, canes badly winterkilled. June 15, first bloom. August 10, first ripe fruit. September 1, new growth 3½ feet.

London: June 1, tips of canes winterkilled. June 15, first bloom. August 10, first ripe fruit; new growth 3½ feet.

Champlain: Three bushes transplanted May 18. July 1, making some growth; few bloom. September 1, new canes 3 feet long.

Orange: Transplanted May 18. July 1, growing. September 1, 3 feet new growth.

Superlative: Transplanted May 18. June 1, fair condition. July 1, seems thrifty. September 1, new growth 3 feet.

GOOSEBERRIES.

Champion: June 1, thirteen plants; good condition; in bloom. June 15, fruit well set. September 1, fruit overripe; picked for seed; 2 feet new growth.

English: June 1, six plants; growing nicely; in bloom. June 15, fruit well set. August 15, fruit ripe; berries large; excellent quality. September 1, 2 feet new growth.

Triumph: June 1, fair condition; in bloom. June 15, very backward; few berries set. September 1, 15 inches new growth.

Red Jacket: June 1, six plants; doing well; in bloom. June 15, few berries. September 1, fruit ripe; good quality; 2 feet growth.

Smith Imperial: June 1, growing nicely; in bloom. June 15, fruit well set. August 15, fruit ripe; good quality; berries large. September 1, new growth 6 inches.

Whitesmith: June 1, nine plants; thrifty; in bloom. June 15, few berries. August 25, fruit ripe. September 1, 2½ feet growth.

Columbus: June 1, eight plants; fair condition. July 1, rather backward. September 1, very little growth.

Industry: June 1, eight plants; fair condition; in bloom. June 15, rather backward; some fruit set. September 1, little growth; fruit ripe.

Thimble berry (native): June 1, growing nicely; in bloom. June 15, fruit well set. August 20, fruit ripe. September 1, new canes 2 feet long.

STRAWBERRIES.

Hollis: May 1, plants injured by frost heaving the ground; promises fairly well. June 15, full bloom; pistillate flower; fruit setting well. July 2, plants

yet blooming; nearly every bloom sets a fruit. July 5, fruit ripening. August 15, last picking. September 1, plants vigorous.

Yakutat (native Alaskan): May 1, plants somewhat injured by heaving of ground. June 15, past full bloom; about half staminate; setting fruit rather sparingly. July 2, fruit ripening. August 1, last picking. September 1, plants vigorous.

Bismark: May 15, plants transplanted. July 1, growing nicely. September 1, many new plants; vigorous.

Enhance: May 15, plants transplanted. July 1, growing nicely. September 1, vigorous new plants.

Magoon: Only a few plants. July 9, a few berries ripe; fine large symmetrical fruit; forms new plants freely.

ORNAMENTALS.

Eglantine: May 1, nine plants; winterkilled to the ground. May 15, new growth starting. June 1, growing nicely. September 1, 3 feet new growth.

Rosa rugosa: May 1, uninjured by freezing; buds swelling. June 15, vigorous new growth; bloom buds nearly open. July 15, layered branches to root new plants. September 1, layered branches rooted poorly; seedlings growing nicely.

Lilac (common): May 15, very backward in starting. June 1, appears thrifty; makes no growth. September 1, 6 inches new growth.

Ural willow: May 1, uninjured by frost; good condition. June 15, growing nicely; blooming. August 1, no seed set. September 1, 3 feet new growth; cuttings did well.

Niobe willow: May 1, tips killed by frost. June 15, growing nicely. September 1, 2 feet new growth.

Mountain ash: May 1, uninjured by frost; in fine condition. June 15, growing nicely. September 1, 15 inches new growth.

Siberian sandthorn: May 1, rather backward in starting. June 15, making some growth. September 1, looks thrifty; 2 inches growth.

Speer elderberry: May 15, very poor condition; badly winterkilled. July 1, two plants growing, but very weak. September 1, in bad condition.

Caragana arborescens: May 15, very backward. June 15, making some growth. September 1, very short growth; looks thrifty.

Caragana microphylla: May 15, very poor condition. June 15, nearly dead. September 1, bad condition.

Lonicera alba rosea: May 1, four plants uninjured by frost; starting nicely. June 1, 15 inches growth; in bloom. September 1, 2 feet growth.

Lonicera tatarica rosea: May 1, hardy; buds swelling. June 15, 1 foot growth. September 1, 30 inches growth.

Lonicera tatarica splendens: May 1, hardy. June 1, growing, but not so vigorous as other varieties. September 1, 1 foot growth.

Lonicera tatarica grandiflora: May 1, hardy; buds swelling. June 15, 1 foot growth. September 1, 15 inches growth.

Lonicera albida: May 1, hardy; growth starting. June 15, 12 inches growth. September 15, 15 inches growth.

VEGETABLES.

The principal investigations with vegetables at the Sitka Station were in testing varieties of potatoes, cabbage, cauliflower, kale, Brussels sprouts, beans, and peas in order that definite suggestions would be possible regarding those varieties adapted to Alaska conditions.

POTATOES.

The following varieties of potatoes were grown at the Sitka Station the past season. Of some of them we had only small quantities of seed; of others, as, for instance, the Freeman, which has been grown here for three years past, we had more seed and grew them in larger quantities.

It is becoming apparent that potatoes depreciate both in size and quality when they are grown here for a few years in succession.

All our potatoes were planted late on account of the cold, wet spring. They were practically all up June 15. The yield per acre is not given for varieties grown on a very small scale.

Extra Early Ohio: A white potato; oblong and slightly flattened; medium size; shallow eyes; skin thin; early; yield at the rate of 280 bushels per acre; 60 per cent first grade, 30 per cent second grade; 10 per cent third grade; quality, first class.

Extra Early Triumph: A white, oblong potato, which resembles the Extra Early Ohio closely. It has, however, shallower, broader eyes than the Extra Early Ohio and averages a little smaller in size; early; quality, first class.

Norwegian No. 1: Imported from Norway in 1904; size medium; irregularly rounded; skin yellow, slightly roughed; eyes very small and deep; early; quality, first class.

Norwegian No. 2: Imported from Norway in 1904; size medium; irregularly rounded; skin white, smooth, and thin; eyes deep and small; resembles Norwegian No. 1 very closely, except that it is a trifle larger and has a whiter skin; quality, first class.

Norwegian No. 3: Imported from Norway in 1904; size medium to small; irregularly rounded; skin red and thick; eyes deep and broad; early; quality, second class.

Freeman: Medium to large; oblong, usually broader at one end, slightly flattened; skin white and thin; eyes shallow; medium early; yield 379 bushels per acre; 54 per cent first grade, 24 per cent second grade, and 22 per cent third grade; quality, dry and mealy. It resembles the Extra Early Ohio closely and is an excellent potato; quality, first class.

Early Ohio: Medium to small; rounded; skin red and slightly russeted; eyes rather deep and narrow; medium early; quality first class.

Bovee: Medium size; oblong, occasionally flattened; skin pink, slightly mottled; eyes small and rather deep; medium early; 74 per cent first grade, 26 per cent second grade; quality first class.

Lincoln: Medium to small; rounded, occasionally oblong; skin pink, mottled, slightly russeted with white specks; eyes medium shallow and broad; medium early; 74 per cent first grade, 26 per cent second grade; quality second class.

Carman No. 3: Medium to small; oblong, flattened, and somewhat irregular; skin white with brown specks; eyes shallow; late; 59 per cent first grade, 28 per cent second grade, 13 per cent third grade; quality first class.

Early Market: Small to medium; rounded; skin light pink, mottled, thick, somewhat russeted; eyes medium deep; early; 65 per cent first grade, 23 per cent second grade, 12 per cent third grade; quality first class.

Irish Cobbler: Medium; rounded and irregular; skin yellow; eyes medium deep; early.

Gold Coin: Large; oblong to rounded, slightly flattened; skin yellow, thick, with numerous small brown specks; eyes shallow and broad; late; yield per acre, 271 bushels; 56 per cent first grade, 33 per cent second grade, 11 per cent third grade; this is considered one of the best potatoes for Alaska; quality first class.

Eureka: Medium to small; rounded; skin yellow and thick; eyes rather large; medium early.

Hamilton Early: Medium; oblong, occasionally rounded; skin white; eyes very broad and shallow; early; yield per acre, 160 bushels; 38 per cent first grade, 34 per cent second grade, 28 per cent third grade.

Burpee Early: Medium; long, slightly flattened; skin light pink, slightly mottled and russeted; eyes shallow and broad; early; quality second class.

Ohio Junior: Medium; rounded, somewhat irregular; skin pink or slightly mottled, thick, and russeted; eyes medium deep and rather large; early; 66 per cent first grade, 34 per cent third grade; quality, third class.

Banner: Large; oval, slightly flattened; skin yellow and thick; eyes shallow and rather broad; early; yield per acre, 217 bushels; 67 per cent first grade, 28 per cent second grade, 5 per cent third grade; quality, second class.

White Beauty: Medium; oval to oblong, slightly flattened; skin yellow; eyes few and very shallow; early; quality, third class.

White Mammoth: Large; oval, flattened, uniform size; skin yellow and smooth; eyes very shallow and broad; early; yield per acre, 174 bushels, all first grade; quality, first class.

Early Harvest: Medium; oblong to rounded; skin yellow, slightly russeted; eyes medium deep; early; yield per acre, 295 bushels; 52 per cent first grade, 25 per cent second grade, 23 per cent third grade; quality, second class.

Vigorosa: Medium to large; oval to oblong; skin mottled, pink; eyes medium shallow; early; yield per acre, 248 bushels; 64 per cent first grade, 18 per cent second grade; quality, first class.

Vornehm: Medium; oval to rounded, slightly flattened, irregular in shape; skin white, slightly russeted; eyes few, small, shallow, and inconspicuous; early; yield per acre, 156 bushels; 47 per cent first grade, 31 per cent second grade, 22 per cent third grade; quality, most excellent.

Early Michigan: Medium; long to oblong; skin yellow, thick, smooth; eyes shallow and small; early; yield per acre, 203 bushels; 61 per cent first grade, 23 per cent second grade, 16 per cent third grade; quality, first class.

CABBAGE.

The plan was to test a number of varieties in order to determine which of them could be recommended for this climate and also to point out those which were not suited to Alaska. In one sense the test was a success, and in another a failure. The cold rainy summer was unfavorable, and only a comparatively few varieties formed heads. Taken as a whole the crop might be called a failure. The value of the experiment lies in the fact that some varieties succeeded under conditions which caused others to fail completely. The statement made in former reports, viz, that early varieties are surest headers, must be reaffirmed with emphasis. Not a single late or what might be called a main crop variety amounted to anything. And of the early sorts those with conical heads did better than the round-headed sorts. The type represented by the Early Jersey Wakefield proved to be the best under these adverse conditions. The varieties which headed took rank in the following order: (1) Early York; small, firm, pointed heads. (2) Early Jersey Wakefield; leaves large and spreading; small pointed heads. (3) Early Large York; small pointed heads. (4) Charleston Wakefield; small loose head, pointed. (5) Extra Early Express; small round heads. (6) Early Spring; small pointed heads. (7) Early Summer; small round heads. (8) Surehead; small oval head. (9) Succession; small round head. (10) Short Stem; small round head. (11) Dwarf Savoy; made loose, round head. (12) Drumhead Savoy; made loose, round head.

The following varieties were failures: Early Drumhead, Early Winningstadt, Premium Flat Dutch, Large Flat Dutch, Red Dutch, All Head, Danish Ballhead. Fottler Drumhead. All Seasons, Stonemason, Marblehead Mammoth Drumhead.

Brussels sprouts were only a moderate success.

CAULIFLOWER.

Only a few cauliflower plants were set out of each kind named below. They all produced heads, but most of them were small and not to be compared with cauliflower grown here in former, more favorable years. The result of the present season places the varieties in about the following order: (1) Early Paris, (2) Dwarf Erfurt, (3) Early London, (4) Short Stem, (5) Early Algiers, (6) Early Favorite, (7) Snowball, (8) Large Algiers.

Cauliflower develops in much shorter time than cabbage, and it can therefore be grown with moderate success in seasons when cabbage fails.

The writer has observed that there is a tendency to crowd things too much in small garden patches nearly everywhere in Alaska. This is a mistake. Crowded plants can not develop normally. Cabbages, even the early varieties, should not be planted closer than 2 feet each way, and cauliflowers not closer than 18 inches, and 2 feet is a better distance for them also.

KALE.

In former reports the qualities of kale as a vegetable adapted to Alaska were dwelt on somewhat at length. The writer feels inclined to emphasize the subject again. Kale is a vegetable which in all northern countries is more extensively grown and more highly prized than cabbage. It is hardy to a degree and in the coast region can stand out all winter, to be gathered as wanted for use. It grows remarkably well in a cold climate, and is par excellence the member of the cabbage tribe best suited to Alaska.

Another difficulty is that many housewives do not know how to use it. Kale can not be eaten raw; it must be boiled for not less than two hours, preferably with a piece of salt pork or else a piece of corned beef. During the winter season particularly there is a dearth of vegetables in Alaska. Kale will supply this lack and every garden should have a patch of it. With proper treatment it will grow anywhere, even as far north as the Arctic Circle. The seeds should be sown in a cold frame or in boxes and the plants set out like cabbages. Kale does not form a head. The plant is a bush of crisp, curly leaves and can be used from the time these leaves are deemed large enough, but it is best after it has been slightly touched with frost. A little kale was grown at the Sitka Station the past season and it did well, as usual.

BRUSSELS SPROUTS.

Another vegetable which is well adapted to Alaska is Brussels sprouts. It is seeded and transplanted in the same manner as cabbage and is sure to succeed well. The plant forms a stalk from 1 to 2 feet high, with numerous leaves up the sides, and at the base of each leaf a small head forms which is the valued part of Brussels sprouts. It was grown successfully at Sitka Station the past season.

BROAD WINDSOR BEANS.

Beans as a class do not succeed well in Alaska; the summers are not warm enough for their normal development. The Broad Windsor bean, however, dif-

fers widely from other species; it is hardier than any of the bush or pole beans commonly grown in the States. It forms a stiff, woody plant 3 to 4 feet high, and produces a number of flat, woolly pods which contain the beans, the valued portion of the crop. They are about the size of and are cooked in the same manner as Lima beans. They should, however, be gathered before they are ripe. They are at their best when they are nearly full grown, but before they begin to ripen. Indeed, they are not likely to ripen in Alaska except under particularly favorable conditions. The writer recommends all settlers in Alaska to grow a row or two of these beans in order to add variety to the list of available vegetables. The seeds should be dropped 6 inches apart in the row and be given the usual care and culture. They were successfully grown at the Sitka Station the past season.

PEAS.

Peas can be grown with reasonable success nearly everywhere, and are valued by everybody. The point the writer now wishes to make is that there is much difference between varieties, and while nearly all kinds may succeed in favorable seasons, in unfavorable seasons many sorts will fail. The two varieties that have given the most satisfaction at the Sitka Station are those which are listed in seed catalogues under the names "Alaska" and "The First and Best." These two sorts have uniformly done well, and we recommend settlers to procure them whenever practicable to do so. They are medium high, requiring brush about 4 feet tall. American Wonder and several other early sorts which are favorites in the States have not done so well at the Sitka Station as the two above-named sorts.

GARDEN AT COLDFOOT.

Judge Frank E. Howard, United States commissioner, Coldfoot, Alaska, has probably the most successful garden north of the Arctic Circle. He sent to the Sitka Station by registered mail a box which contained a cucumber, a stalk of rhubarb, two potatoes, two potato balls, and a carrot as a sample of the products of his garden. Coldfoot is located about 68° N., 60 miles north of the Arctic Circle, and the fact that he should be able to grow these vegetables to such perfection in that far northern latitude speaks volumes for the possibilities of Alaska. It is true such results are not obtained spontaneously. To grow vegetables of any kind, even with moderate success, requires judgment as to the selection of the garden and care and forethought in the cultivation of the crop. These essentials Judge Howard has supplied with magnificent results. The subjoined brief letter tells the story in a few words. The remarkable success of this garden is further testified to by Mr. C. W. H. Heideman, who made a trip through arctic Alaska the past season for the purpose of collecting specimens of the flora and also to see the country. He saw Judge Howard's garden and was struck with the possibilities it revealed. Pl. V, fig. 1, is from a photograph of the above-mentioned samples which the judge sent to Sitka Station.

COLDFOOT, ALASKA, *September 1, 1906.*

Prof. C. C. GEORGESON,
Alaska Experiment Station, Sitka, Alaska.

DEAR SIR: I send you a few samples from my garden this year, gathered at random, and not picked. I will harvest my crop about the 10th, and will then send you full report.

Rhubarb: Grown from seed planted in the house in April and transplanted to the garden May 15. Stalk, from the ground to base of leaf, 19 inches.

FIG. 1.—VEGETABLES GROWN AT COLDFOOT, NORTH OF ARCTIC CIRCLE. RHUBARB, CUCUMBER, CARROT, POTATOES, AND POTATO BALLS.

FIG. 2.—VEGETABLES GROWN BY FRED PATCHING, LORING.

Cucumber: Grown from seed planted in the house in April, and transplanted to open garden last of May.
Potatoes: Planted last of May.
Growing weather will last two weeks yet.
I can not send by mail an 8-pound head of cabbage or a 16-pound turnip.

Very truly yours,

FRANK E. HOWARD, *Commissioner.*

REPORT OF WORK AT THE COPPER CENTER STATION.

By J. W. NEAL, *Superintendent.*

INTRODUCTION.

The station now has about 40 acres under cultivation and 80 acres of pasture land fenced. There are nearly 3 miles of fence, including corrals and cross fences. Other improvements comprise a two-room cabin, provision cache and shed room, blacksmith shop and tool house, barn, root cellar, standard thermometer shelter, compost pens, etc. Eleven acres have been seeded to various grasses, and 4 acres are in winter grains, leaving 25 acres for additional crops next season. The last is now plowed up for spring seeding.

Crops were much heavier this year than last, owing to the unusual amount of rainfall during the growing season, but the wet weather kept the grains from ripening until the fall frosts set in, and even less seed matured than last year. With the exception of a few small patches of oats the farthest advanced, the entire crop was cut and cured for hay. The crop is estimated at 22 tons of dry hay.

As set forth in the field notes, each year proves the value of fallowing either old or new ground. This season a 1-acre tract of new ground yielded fully 2 tons of dry oat hay. The tract was plowed in July, 1905, and seeded to common oats late in May. Another small tract of old ground, turned but not cropped last season, produced equally as heavy a crop this year as the new ground above mentioned, while closely adjoining ground, cropped both seasons, did not yield to exceed a half ton per acre either year. In other instances where seed did not catch last year the crop this season was decidedly better than elsewhere. Still further observations showed that where the ground produced a heavy crop last year the crop was correspondingly light this year and a heavier crop where it was very light last season. At Willow Creek, 12 miles south of Copper Center, a small plat of oats growing on old ground was seen which would make more than 3,000 pounds of hay per acre. Another plat on new ground plowed this season and seeded to oats yielded, probably, a half ton per acre. Portions of the latter plat were considered too poor to cut and were pastured off. No seed matured there. This ranch is owned by Frank Bingham. He has some timothy growing which did not look very thrifty. His vegetable garden was seeded late and had not made much growth when the writer saw it. At Tonsino, 12 miles farther south, was a very fine garden owned by Jake Nafsted. He had installed a small irrigating plant, raising the water from the Tonsino River by an undershot current wheel having fruit cans nailed to the rim. The water flowed some distance through small V-shaped troughs to the garden. The river water is too cold for irrigation, but flowing through these troughs it warms up considerably before reaching the plants. At Taslena, 8 miles north of Copper Center, William Klitzke has a homestead and is slowly becoming established as a Copper Valley farmer. Last fall he succeeded in getting a small piece of ground cleared, and burned the moss off during a very dry spell of weather. There the surface is covered with from 4 to 6 inches of moss in addition to a thicket of willow and alder brush. Hav-

ing no farm implements of any kind, he made a wooden-tooth harrow and after seeding the plot to oats dragged this implement over the ground several times. The seed came up quickly and made a thick stand. He claims to have seeded one-sixth of an acre and harvested 1,500 pounds of dry oat hay. The writer saw a growing crop in full head, and, while it was a fine crop, he would not estimate it to go more than 4,000 pounds per acre.

Mr. Klitzke also had some barley growing which looked good. While he cut everything for hay, the writer doubts whether it could have matured any good seed had it been left to ripen. The crops were green August 23, and heavy frosts soon followed. Some small plats of timothy were doing well. Mr. Klitzke had a good garden, containing many of the hardy vegetables; also some potatoes from seed which was supplied him from our small home-grown stock. His vines were frosted several times during the season, but he seemed very enthusiastic over the yield, and says he will raise a ton of potatoes next year. He now has 3 acres broken for next year.

At Gulkana, 19 miles farther north, is a small garden containing most of the hardy vegetables grown in the north, including some potatoes. August 22 the potato vines were small and frozen black. The other vegetables were poor, but the writer was told they had already used the best in the road house.

At Gakona, 4 miles farther north, there was a very fine garden and grain field. Everything had been planted late and was not nearly so far advanced as the gardens and fields around Copper Center. August 22 much of the grain was just heading. The first seeding was about filled and was being cut for hay. Charles W. Bram, the manager, had seeded 3 acres to oats. The crop was estimated at 3 tons, and all the hay he has he can sell on the Fairbanks trail, 4 miles from his place, for 15 cents a pound. The Gakona garden is in a very favored spot, being sheltered from summer frosts, and always yields well.

The gardens about Copper Center this season were the best the writer has seen in the valley. G. S. Clevenger has a garden three-fourths of a mile from the station which paid him well for his careful attention. It is 50 by 100 feet and under a high state of cultivation. The soil is very sandy and about 10 feet above the Copper River. Some ashes and hen manure have been applied at different times for two years. The following vegetables were grown this year: Lettuce and radishes, which were exceptionally fine; red table beets, roots from a half to a pound; carrots, very crisp, tender roots, averaging from a fourth to a half pound each; ruta-bagas, roots firm and crisp, weighing from 6 to 7 pounds; peas, which made a slow and rather feeble growth, the pods filled poorly, many not filling at all; onions, seed planted in the open making bulbs fair size for table use; cabbage, seeded in the open ground, the first plants being frosted and nearly all killed, but new seeds planted later yielded a number of firm heads weighing from 2 to 4 pounds; potatoes, fifteen hills planted from seed grown at the station last year; the vines of the potatoes were frozen back twice soon after they came up, but the third sprouting made good sized tops and blossomed. The vines were frosted again in August, after which Mr. Clevenger cut the injured tops off and covered each hill with burlap. Single hills yielded 3 to 5 pounds of marketable potatoes.

Judge Holman, of Copper Center, had a very fine garden, raising about 40 bushels of root vegetables, including 450 pounds of potatoes.

THE STATION GARDEN.

Few vegetables were grown at the station this year, as attention was given largely to field crops. The following varieties were grown in small quantity:

Purple Top White Globe turnip: Seeded May 28; June 15, only a few came

up; July 1, making good growth; roots weighed 4 to 8 pounds by the end of the season.

White Flat Strap Leaf turnip: Seeded May 28, coming up June 8; July 1, tops making thrifty growth; many roots weighed 2 to 3 pounds, measuring 6 inches across.

Crimson Globe beets: Seeded May 28, coming up June 11; July 1, making good tops; the roots attained a fair size, measuring 6 to 10 inches around.

Bassano beets: Seeded May 28, coming up June 15; July 1, making rapid growth; August 1, growth still vigorous; the roots were slightly smaller than Crimson Globe.

Champion ruta-baga: Seeded May 28, slow in coming up; July 1, growth vigorous; roots did not get large, averaging 9 inches around.

Yellow Swede: Seeded May 28; made very fine smooth roots, weighing from 2 to 4 pounds.

Scarlet Horn carrots: Seeded May 28; very slow in coming up and the growth slow; by fall the roots measured 3 to 6 inches around; excellent quality.

Alaska peas: Seeded May 28, coming up June 6; made a good growth and began blooming July 4; many pods set on the vines, but only a small per cent filled.

Prolific Early Market peas: Seeded May 28, coming up June 10; made about the same growth as the Alaska. Either variety usually does well here.

Cabbage: Some seed was planted singly in pots and set in a hotbed about May 1. The plants were set in the garden June 10. The pots were milk tins unsoldered and wrapped with twine, and the plants were easily transplanted without disturbing the roots. The plants made a vigorous growth and headed, the largest being the size of a 2-quart cup.

Broccoli: Seeded and transplanted with the cabbage, made fair-sized plants, but only one came to head, it being about the size of a large teacup.

Kale: Seeded May 28, up June 10; growth slow at first; plants were good size by the end of the season.

Rhubarb: Old plants made good growth. The first cutting was made June 8, making several cuttings during the season. The stalks were tender and juicy until late in September.

Beans: One row each of Broad Windsor and Horse bean was seeded May 30. Each made good stalks, blossomed and set good pods, but were killed by frost before the beans were ready for table use.

Potatoes: Three varieties were planted May 19, in warm new-ground soil which had been broken up in July, 1905. After the ground was thoroughly worked small trenches were made the depth of a miner's shovel and half filled with fresh stable manure. The dirt was then raked back and the whole surface made level. Stakes had been driven to locate the trenches, and after restretching the line over the center of the trenches the potatoes were planted under the line 2 inches deep and 10 inches apart in the row, leaving about 1 inch of soil between the potatoes and the manure. The rows were only 2 feet apart, which is a little close for hilling, but the ground was thoroughly shaded by the vines, which helped to retain the moisture. The seed potatoes were grown at the station last year and kept in the root cellar through the winter. They were removed to a warm room early in May and well sprouted before planting. The potatoes were rather small and planted whole, dropping one potato in a place. All varieties were coming up by May 27. The vines were frozen to the ground May 31. New growth began to appear above ground June 8. July 1 the vines were making a vigorous growth and sending out flowering stems. Some blossoms appeared by July 10. The top leaves were frosted July 16. Another frost

August 8 killed the top leaves, and was followed by light injuries from frost August 16, 22, 24, 29, and September 4, when the vines were killed to the ground. The vines were cut off at once and the potatoes dug September 8. During the entire season there was no noticeable difference in the different varieties. About 10 feet of each row came on old ground not trenched or fertilized. These made less top growth and one-fourth less yield. Each variety occupied two rows 49 feet long. Extra Early Ohio yielded 125 pounds, Garfield 115 pounds, and Freeman 135 pounds, totaling 375 pounds on the plat 14 by 49 feet. After the small ones were culled out there were 350 pounds of marketable potatoes, many of them weighing 8, 12, and 16 ounces each. Probably 98 per cent were smooth, choice potatoes. This plat yielded at the rate of 22,050 pounds of marketable potatoes per acre and 1,575 pounds too small to market, which we used on our own table.

NURSERY.

A number of apple grafts and seedlings, also a few raspberry, currant, and gooseberry roots, were received last year and set in nursery form. Only a small percentage started last year, and these made little growth. Two apples, eight currants, two raspberries, and one gooseberry lived through the winter and made a slow start this season. The apples made 4 inches growth, currants 3 to 6 inches, raspberries 24 inches, sending out four canes each. The gooseberry is dead.

GRASSES.

Many of the grasses seeded in former years have died out or made little growth this year. They were on very dry soil and suffered for want of moisture. This season a tract of heavy moist soil was selected and the following grasses seeded June 2 in plats 20 by 60 feet:

Alsike clover: Up June 12, made rapid growth, but plants soon begun to turn very yellow, perhaps caused by the roots running down into the cold clay subsoil. Plants slender; season's growth, 8 to 10 inches. A small plat seeded in the yard late in June on manured new ground made a better showing; season's growth 12 to 14 inches and thick all over the ground. This plat maintained a good color throughout the season. The soil is light with sandy subsoil.

Alfalfa: Lot "A" (Yellow as Gold). Seed from Ogden, Utah, up well June 11; season's growth 8 to 12 inches; good stand. As the season advanced the plants turned very pale yellow and took on a sickly appearance, evidently caused by the roots striking the frost still in the clay subsoil. The plat is on heavy black soil with a stiff clay subsoil, which is doubtless too cold for either alfalfa or clover. Better results may be obtained on the lighter and warmer soil.

Agropyron tenerum: Up June 12. Season's growth 20 inches. Very promising.

Festuca elatior: Up June 13. Season's growth covered the ground well.

Hassock grass: Did not come up.

Holcus lanatus: Up thick June 13. Season's growth covered the ground well.

Redtop: Up June 12. Stand good. Season's growth 6 to 10 inches.

Orchard grass: Up June 13. Good stand. Season's growth 12 inches.

Timothy: Up June 11. Stand good. Season's growth 12 to 18 inches; headed. Timothy seeded in the yard as a lawn grass in August, 1905, on new ground highly fertilized with fish guano made a fine crop of hay this season. The ground being broken in July, it became dry and dusty, but the seed was sown some time in August in hopes of rain to sprout it. The seed did not come up

FIG. 1.—ONE OF THE GRAIN PLATS AT COPPER CENTER STATION.

FIG. 2.—SHOWING EFFECT OF FERTILIZERS ON OATS—FERTILIZED AT RIGHT; NO FERTILIZER AT LEFT.

until in September and made little growth that fall. In fact, but a small percentage of the seed germinated that fall. In the spring of 1906 it came up very thick, as it had been seeded thick to get a quick sod. The growth was slow at first, but the season turned out quite favorable, and it made a fine crop, although very irregular in height. It headed well, and the seed was nearly matured when the frosts set in. The crop was cut for hay and weighed when cured and baled. The plat is 22 feet wide and 68 feet long. It yielded 215 pounds of dry hay, or 6,114 pounds per acre. Two acres of very low and wet ground were seeded to timothy with oats May 30. It made only a fair stand and not much growth.

Essex Rape: Up June 10. Season's growth 8 to 14 inches. Injured by frost July 15; August frost killed the top.

Bromus inermis: Seedings of 1903–4 made good pasture by May 15. At that date outside seed was just starting growth. June 15, 10 to 16 inches high; July 1, headed, seed stems 24 to 30 inches high; July 15, blooming; little seed matured. This grass is valuable for spring pasture, but does not yield enough to be profitable as a hay crop. Seedings of 1906 made about the same showing as former seedings did their first season. Nearly 7 acres are seeded to this variety, but is not believed to be as profitable as oat hay at present prices.

FIELD CROPS.

Most of the following were seeded in four different tracts and at as many different dates on the various kinds of soil, comparing also fertilized and unfertilized tracts. For convenience, in this report tracts on which observations are given will be classed as tracts A and B (Pl. VI, figs 1 and 2). Tract A is new ground, summer fallowed, fertilized with guano at the rate of probably 400 pounds per acre. Tract B is old ground, cropped last year, and without fertilizer of any kind used.

WHEAT.

Romanow: Tract A, seeded May 11; up in thirteen days; stand thin; heading July 12; blooming July 27; height, 40 to 48 inches. No seed matured. Tract B, seeded May 12; up in thirteen days; stand thin; heading July 14; blooming July 31; height, 40 to 42 inches. No seed matured.

Saskatchewan Fife: Tract A, seeded May 11; up in twelve days; stand fair; heading July 14; bloom notes lost; height, 46 inches. No seed matured. Tract B, seeded May 12; up in ten days; stand good; heading July 18; bloom notes lost; height, 30 to 40 inches. No seed matured.

Romanow, S. P. I. No. 8892: Tract A, seeded May 11; up in thirteen days; stand fair; heading July 11; blooming July 27; height 50 inches. No seed matured. Tract B, seeded May 12; up in ten days; stand good; heading July 12; blooming July 26; height 40 inches. No seed matured.

Velvet Chaff Blue Stem: Tract A, seeded May 11; up in eleven days; stand fair; heading July 15; bloom notes lost; height 48 inches. No seed matured. Tract B, seeded May 12; up in ten days; stand good; heading July 14; bloom notes lost; height 30 to 40 inches. No seed matured.

Glyndon: Tract A, seeded May 11; up in thirteen days; stand thin; heading July 13; bloom notes lost; height 40 inches. No seed matured. Tract B, seeded May 12; up in twelve days; stand fair; heading July 14; bloom notes lost; height 36 inches. No seed matured.

Ladoga: Tract A, seeded May 11; up in twelve days; stand fair; heading July 14; blooming July 27; height 48 to 54 inches. No seed matured. Tract B, seeded May 12; up in ten days; stand good; heading July 13; blooming July 26; height 33 to 36 inches. No seed matured.

Early Riga: Tract A, seeded May 11; up in twelve days; stand fair; heading July 5; blooming July 15; height 40 inches. Seed was nearly matured when killed by frost. Tract B, seeded May 12; up in ten days; stand good; heading July 5; blooming July 15; height 24 to 36 inches. No seed matured.

Plumper: Tract A, seeded May 11; up in thirteen days; stand thin; heading July 6; blooming July 17; height 40 to 45 inches. No seed matured. Tract B, seeded May 12; up in thirteen days; stand thin; heading July 5; blooming July 20; height 30 to 40 inches. No seed matured.

Preston: Tract A, seeded May 11; up in twelve days; stand good; heading July 13; blooming July 20; height 50 inches. No seed matured. Tract B, seeded May 12; up in ten days; stand good; heading July 13; blooming July 31; height 42 inches. No seed matured.

Romanow, "True Stock:" Received June 7 and seeded at once in tract A; up June 13; heading August 15; blooming very late; height 44 to 50 inches. No seed matured.

Harold: Tract A, seeded May 11; up in thirteen days; stand thin; heading July 5; blooming July 15; height 40 inches. No seed matured. Tract B, seeded May 12; up in twelve days; stand fair; heading July 5; blooming July 15; height 24 to 36 inches. No seed matured.

Romanow (Sitka seed): Tract A, seeded May 11; up in thirteen days; stand thin; heading July 14; blooming July 26; height 50 to 60 inches. No seed matured. Tract B, seeded May 12; up in thirteen days; stand thin; heading July 15; blooming July 27; height 40 to 47 inches. No seed matured.

Dufferin: Tract A, seeded May 11; up in twelve days; stand fair; heading July 5; blooming July 16; height 42 to 50 inches. No seed matured. Tract B, seeded May 12; up in eleven days; stand good; heading July 8; blooming July 26; height 30 to 38 inches. No seed matured.

Romanian: Tract A, seeded May 11; up in thirteen days; stand fair; heading July 13; bloom notes lost; height 50 inches. No seed matured. Tract B, seeded May 12; up in twelve days; stand fair; heading July 14; bloom notes lost; height 24 to 40 inches. No seed matured.

Stanley: Tract A, seeded May 11; up in twelve days; stand good; heading July 13; blooming July 25; height 50 to 52 inches. No seed matured. Tract B, seeded May 12; up in twelve days; stand fair; heading July 14; blooming July 31; height 24 to 40 inches. No seed matured.

Ebert: Tract A, seeded May 11; up in twelve days; stand good; heading July 8; blooming July 17; height 44 inches. No seed matured. Tract B, seeded May 22, it being missed on the 12th; up May 29; heading July 10; blooming July 28; height 30 to 36 inches. No seed matured.

BARLEY.

Chevalier: Tract A, seeded May 10; up in eleven days; stand good; heading July 3; blooming July 10; height 32 to 38 inches. A few heads matured. Tract B, seeded May 12; up in nine days; stand good; heading July 2; blooming July 10; height 24 to 28 inches. No seed matured.

Trooper: Tract A, seeded May 10; up in eleven days; stand good; heading July 4; blooming July 12; height 40 to 42 inches. Only a few heads matured. Tract B, seeded May 12; up in nine days; stand good; heading July 12; blooming July 15; height 24 to 30 inches. No seed matured.

Black Hulless: Tract A, seeded May 10; up in twelve days; stand fair; heading July 6; blooming July 13; height 34 inches. A small amount of seed matured. Tract B, seeded May 12; up in ten days; stand fair; heading July 7; blooming July 14. No seed matured.

Sisolsk: Tract A, seeded May 10; up in eleven days; stand good; heading July 5; blooming July 12; height 40 to 45 inches. A few heads matured. Tract B, seeded May 12; up in eleven days; stand good; heading July 7; blooming July 14; height 30 to 36 inches. No seed matured.

Champion: Tract A, seeded May 10; up in eleven days; stand good; heading July 4; blooming July 12; height 40 inches. A few heads matured. Tract B, seeded May 12; up in nine days; stand good; heading July 5; blooming July 13; height 28 inches. No seed matured.

Odessa: Tract A, seeded May 10; up in eleven days; stand good; heading July 7; blooming July 15; height 40 to 42 inches. A few heads matured. Tract B, seeded May 12; up in nine days; stand good; heading July 8; blooming July 16; height 24 inches. No seed matured.

Manchuria: Tract A, seeded May 10; up in twelve days; stand good; heading July 7; blooming July 14; height 40 to 44 inches. A few heads matured. Tract B, seeded May 12; up in eleven days; stand good; heading July 8; blooming July 16; height 24 to 30 inches. No seed matured.

Hannah Fall: Tract A, seeded May 10; up in eleven days; stand good; heading July 8; blooming July 15; height 40 inches. A few heads matured. Tract B, seeded May 12; up in nine days; stand good; heading July 11; blooming July 18; height 30 inches. No seed matured.

Manshury: Tract A, seeded May 10; up in twelve days; stand good; heading July 7; blooming July 14; height 40 inches. A few heads matured. Tract B, seeded May 12; up in twelve days; stand good; heading July 8; blooming July 15; height 40 inches. No seed matured.

Hannah, S. P. I. No. 9133: Tract A, seeded May 10; up in eleven days; stand good; heading July 7; blooming July 15; height 32 to 36 inches. A few heads matured. Tract B, seeded May 12; up in nine days; stand good; heading July 8; blooming July 16; height 26 to 30 inches. No seed matured.

Tennessee Winter, S. P. I. No. 15829: Tract A, seeded May 10; up in eleven days; stand good. Did not send up any stalks until very late in the season, but made a thick, matted, short growth. The few stalks sent out late headed early in August. Did not bloom. Height 40 inches. Tract B, seeded May 12; up in ten days; stand good; behavior about as in tract A. The few stalks sent up were heading August 20. Height 26 inches. Did not bloom.

No barley matured on the station, except in plat A, which is on light, warm soil in the yard and at the edge of a high bank, which tract escapes all light frosts, and the heavier frosts do little damage. The barley was killed on other parts of the station by frost August 24. The barley in plat A was slightly injured, but some of the seed will grow. It matured early in September. Chevalier, Champion, Manchuria, and Odessa ripened a little earlier than other varieties.

OATS.

Tartar King: Tract A, seeded May 10; up in twelve days; stand good; heading July 12; blooming July 21; height, 40 to 46 inches. Some heads matured. Tract B, seeded May 12; up in eleven days; stand good; heading July 18; blooming July 27; height, 28 to 36 inches. No seed matured.

Banner: Tract A, seeded May 10; up in eleven days; stand good; heading July 12; blooming July 22; height, 44 to 50 inches. A few heads matured. Tract B, seeded May 12; up in eleven days; stand good; heading July 19; blooming July 29; height, 20 to 36 inches. No seed matured.

Sixty Day: Tract A, seeded May 10; up in thirteen days; stand good; heading July 12; blooming July 20; height, 44 inches. A few heads matured. Tract B, seeded May 12; up in thirteen days; stand good; heading July 19; blooming July 29; height, 20 to 36 inches. No seed matured.

Finnish Black: Tract A, seeded May 10; up in twelve days; stand good; heading July 6; blooming July 16; height, 52 to 58 inches. A small amount of seed matured. Tract B, seeded May 12; up in twelve days; stand good; heading July 12; blooming July 25; height, 40 to 44 inches. No seed matured.

Burt Extra Early: Tract A, seeded May 10; up in thirteen days; stand good; heading June 29; blooming July 13; height, 40 to 44 inches. A few heads matured. Tract B, seeded May 12; up in thirteen days; stand good; heading July 2; blooming July 14; height, 36 inches. No seed matured.

Swedish Select: Tract A, seeded May 10; up in twelve days; stand good; heading July 10; blooming July 18; height, 40 to 45 inches. A few heads matured. Tract B, seeded May 12; up in twelve days; stand good; heading July 13; blooming July 20; height, 30 to 40 inches. No seed matured.

Belyak, S. P. I. No. 10624: Tract A, seeded May 10; up in fourteen days; stand thin; heading July 14; blooming July 25; height, 48 to 50 inches. No seed matured. Tract B, seeded May 12; up in thirteen days; stand good; heading July 19; blooming July 30; height, 24 to 33 inches. No seed matured. It may be noted that a few heads matured in tract A and none in tract B.

A small amount of oats matured in the large field plats on light, dry soil near the high bank mentioned elsewhere in this report. A small percentage of that saved was frosted August 24, but most of the seed looks good. The following varieties and amounts were cradled and flailed out for seed: Finnish Black, 150 pounds; Banner, 70 pounds; Burt Extra Early, 32 pounds; Swedish Select, 45 pounds; or 290 pounds in all. These varieties were ripe enough to cut September 5, Burt being a little later than the other three varieties named. Sixty Day was still later under same conditions and nearly all killed by frost. The five varieties were seeded with horse drill May 16 and 17 on like soil and location.

MILLET.

Three varieties of millet were received in July and seeded at once, but too late to come to anything.

QUINOA.

Common: Seeded May 22; up June 2; stand thin; growth feeble; plants 16 to 24 inches high. No seed matured.

True: Seeded May 22; up June 2; stand thin; growth somewhat stronger than the Common; plants 24 to 30 inches high. No seed matured.

BUCKWHEAT.

Silver Hull: Home seed from crop 1903. Seeded May 11; up May 24; stand fair; blooming July 2; height, 15 to 20 inches; damaged by frost July 15; killed by frost July 24.

RYE.

Rye, S. P. I. No. 11268: Seeded May 16; up May 26; stand good; heading June 27; blooming July 12; height, 40 to 48 inches. No seed matured.

The above rye is said to be a winter variety. It made a fine crop of hay from spring seeding. The same seeded late in July with winter wheat is now 15 inches high and heading September 25. With this growth and behavior it can not stand our cold winters.

Spring rye ("True Stock"): Tract A, seeded May 11; up in eleven days; stand good; heading June 25; blooming July 11; height, 48 to 56 inches. Seed nearly matured when frosted. Tract B, seeded May 12; up in ten days; stand good; heading June 27; blooming July 12; height, 48 to 52 inches. No seed matured.

Several varieties of winter wheat and rye were seeded July 27 and duplicated August 3, 1905. They all came up quickly and covered the ground well by winter. There was an unusual abundance of rabbits last fall, and before the snow fell they had eaten the grain off very close to the ground, which caused much of the grain to be winterkilled and also retarded the spring growth of what lived through.

Kharkov wheat, S. P. I. Nos. 9125, 9129, 2955, and 2956 were seeded. A few stalks of No. 9129 lived through, but made a slow start and headed several days later than spring seedings. The straw did not ripen, and the grain was killed by frost before it was filled. The other varieties were all winterkilled.

Rye, S. P. I. No. 5905 was all winterkilled.

Excelsior Winter: A few stalks lived, heading June 20; blooming July 12; height, 42 to 54 inches. Seed nearly matured when killed by frost August 24.

Winter rye (var.?): A few stalks lived through, heading June 22; blooming July 10; height, 54 inches. Seed nearly matured when killed by frost August 24.

Amber rye: A fair stand lived through, heading June 18; blooming July 1; height, 48 to 54 inches. A few heads matured fair seed.

REPORT OF WORK AT THE RAMPART STATION.

By FRED E. RADER, *Superintendent.*

GENERAL OBSERVATIONS.

The growing season of 1905 closed very early. There was snow and rain September 8 and a snowfall of 1½ inches on September 10, most of which melted in a few days. Again, between September 15 and September 18, 5¾ inches of snow fell, the greater part of which did not leave the ground until spring. The snowfall for the entire winter amounted to 48 inches, which is considerably more than the average. The winter was considered an unusually cold one. There were a number of periods of low temperatures and an especially severe one during the month of January. The lowest temperature for the winter, —66° F., was registered on January 18. For a period of twenty days—from January 5 to January 24, inclusive—the average minimum temperature was —56.9°. The mean minimum for the month was —44°, and the mean maximum —29.7°. But with all the low temperatures fall grain, pansies, rutabagas, and parsnips, which had been left in the ground, survived in perfect condition. This was, no doubt, due to the protection afforded by the thick covering of snow and also to the fact that there was a considerable amount of snow on the ground before there was any freezing weather.

The spring was rather late this year. Fall rains had saturated the ground so well and the heavy snow required so long a time to melt that none of the ground was in condition to be plowed and seeded until May 26, eight days later than last year, and land that had been previously cleared but not broken up could not be plowed before June 9.

A predicted overflow of the Yukon River became a reality, and on May 31 the present station residence, a log cabin near the bank of the river, had to be abandoned. The water began to recede June 5, and ten days later the cabin was dry enough again for occupancy. The cleared land is on higher ground, and no damage was done beyond spoiling the kitchen garden and filling the cabin with mud and trash. The new cottage stands back from the river on the cleared land, where there is no danger from overflows.

Taken as a whole, the summer was an especially favorable one for growing grains and vegetables. A comparison with the average temperatures for June, July, and August of last year shows an average nearly 3° higher for this season. It was a little dry during June and somewhat too wet and cloudy during the latter part of August, but everything on the station did well in spite of late planting, and the vegetable gardens in this vicinity were uniformly a success.

There was a very noticeable improvement in the productiveness of the soil cropped for the second time this season. Last year, except where piles of stumps and brush had been burned, the growth of grain was very poor and spindling, but this year it was uniformly good everywhere. A plat put in potatoes last year and yielding no more than the seed planted, this year gave a yield of sixfold without the application of fertilizer of any kind.

The first frost came August 25, the thermometer falling 7° below freezing. This killed wax beans and buckwheat and injured potatoes, peas, and broccoli. Other vegetables and grains were apparently uninjured. There have been a number of frosts since, but the lowest temperature up to the present time, September 26, has been 9° below freezing. There has been no snow yet even on the hills about here.

No additional land was cleared during the summer. Besides caring for the crops and making hay, a road one-fourth mile long, extending from the river to the cleared land, has been almost completed, and a five-room frame cottage, 28 by 30, with wood shed attached, is under construction. It is hoped to complete the exterior work on the cottage before cold weather sets in. The interior work will be done during the winter. A log barn and implement shed, 30 by 30, is also in process of construction and will be practically completed by the end of the month. One laborer has been employed since July 1.

During the summer a side-hill plow and a stump puller were added to the station's equipment, and on September 18 Mr. D. C. Witherspoon, of the United States Geological Survey, turned over to the station two of the best horses he had used in a pack train during the summer. The work has progressed to a state where it is necessary that the station own its own team. It has proven a great annoyance, as well as an expenditure of much time and labor, to transfer a team back and forth across the river. With the aid of the team and the stump puller it is hoped that a considerable acreage can be added to the clearing next summer.

WINTER GRAINS.

The following winter grains were seeded August 18, 1905, on land which had never previously been cropped, and the results can be considered very good. The season closed so early that the grains did not make a good growth, and it was feared that they would be killed by the severe cold weather, but they survived the winter in splendid condition and began growing vigorously as soon as the weather was favorable. Since 1900 rye has never failed to winter successfully:

Amber Winter rye: June 15, an occasional head; July 2, fully headed and in bloom; July 15, grain in milk; August 1, grain in hard dough; August 18, ripe and harvested. It grew to an average height of 48 inches. The heads were short, but well filled, and the grain is plump.

Giant French Winter rye: June 15, an occasional head; July 2, headed and in bloom; July 20, grain in milk; August 10, grain in hard dough; August 31, ripe and cut. Average height 54 inches; heads of good length.

Excelsior Winter rye: Practically same as Giant French.

Kharkov Winter wheat: In early part of season did not do well. July 2, partially headed; July 20, fully headed; August 10, grain in soft dough, doing

better than early in season; September 5, part of it ripe and cut; remainder cut September 10. Did much better than last year and seems more promising.

It was planned to seed a considerable portion of the cleared land to winter grain this season, but the necessary seed did not arrive until August 24, too late to insure a good growth this fall, so only small plats of the following varieties were seeded. They have come up and have made a fair growth, but the weather since the seeding has been more favorable than usual. Varieties seeded were: Kharkov Winter wheat, S. P. I. No. 12001; Winter barley from Bulgaria, No. 521; Winter barley from Bulgaria, No. 522; Winter rye, No. 11268; Snoma Winter oats, No. 274; Tennessee Winter barley.

SPRING GRAINS.

The number of varieties of spring grain was not very great, owing to a lack of seed. In most cases the stand was rather thin; it was seeded that way in order to give the individual plants plenty of room to develop. The wet weather during the latter part of August not only retarded ripening but also developed an undesirable feature in the barley and oats. It caused additional stalks to come up from the roots of the plants, and these were just in head when the rest of the grain was ripe. This may have been due to the wet weather, to thin seeding, to a peculiar condition of the soil, or to a combination of several of these causes. A beginning was made in the development of earlier ripening varieties by the selection of the earliest ripening heads of each variety grown. These will be propagated by themselves next season.

Manshury barley: Seeded May 26; June 5, coming up; grew quite rapidly, and by July 14 was fully headed; July 20, in bloom; August 10, grain in dough; August 27, first heads ripe; September 15, harvested. Grew to average height of 30 inches. Fine large heads.

Lapland barley: Seeded May 26; June 5, coming up; grew very well, and by July 14 was fully headed; August 20, first heads ripe; September 12, ripe and cut. Very similar to Manshury except a little earlier this year.

Two-rowed barley: Seeded May 30; June 15, fair stand, 1½ inches high; July 14, heading; August 10, grain in soft dough; September 12, ripe and cut.

Saskatchewan Fife wheat: Seeded May 30; June 8, coming up; August 1, fully headed; August 10, in full bloom. Did not develop further than dough state of grain. Similar result last year.

Spring rye: Seeded May 30; June 8, coming up; July 20, fully headed; August 1, in bloom; did not mature; the reason is not known. It heads and blooms early enough, but for some reason approaches maturity too slowly. Did the same way last year.

Burt Extra Early oats: Seeded May 30; June 10, coming up; July 20, headed; August 1, in bloom; August 10, grain in milk; September 1, first heads ripe; September 15, harvested. Not a very desirable variety. Straw short and fine and heads small.

Finnish Black oats: Seeded May 26; germinated poorly; July 20, fully headed; August 1, in bloom; August 10, grain in milk; September 15, cut. A tall variety with large heads. A very desirable variety for this latitude if it can be made to mature earlier.

Russian buckwheat: Seeded May 30; June 15, coming up rather slowly; July 20, growing well; blooming profusely; killed by frost August 25; one-fourth crop ripe.

POTATOES.

Early Rose: Seed grown by the station in 1905. The sprouts were started by keeping them in a warm place for some time. Planted May 28. Part of

them were planted by placing each potato in the ground by hand, care being taken not to break off the sprout. The remainder were covered with a hoe in the ordinary way. Those planted with extra care came up soonest, grew the largest tops and the most mature potatoes, and produced nearly twice as much as those planted in the ordinary way.

Burbank: Rampart seed grown by Capt. A. H. Mayo. Planted June 2. Grew well and produced tubers of good size.

The potatoes were a good crop. Part of the ground was fertilized with barnyard manure. The average yield altogether was about tenfold. The quality is good.

GARDEN VEGETABLES.

Early Alaska peas: Seeded June 2; grew splendidly; July 25, first pods large enough for use; produced well for a month. A splendid variety.

Prolific Early Market peas: Practically same as above.

Marblehead Mammoth peas: Seeded June 2; a large late variety; pods large enough for use by August 18.

Beets: Three varieties were seeded June 2—Crimson Globe, Dirigo, and Detroit Dark Red. All produced beets of good size. All have a tendency to go to seed, the last-named variety perhaps most of all.

Hollow Crown parsnip: Seeded June 4; very slow in coming up; produced some roots of fair size.

Scarlet Horn carrot: Seeded June 4; grew very slowly for the first month; produced a very good crop.

Yellow Danvers and Extra Early Brown Spanish onion: Very few seed germinated.

Thorburn Improved ruta-baga: Seeded June 4; came up a fine stand; August 10, some large enough for use; produced a fine crop.

Purple Strapleaf turnip: Seeded June 4; came up fine stand and grew splendidly; large enough for table use by July 20.

Early Scarlet Turnip radish: Seeded at intervals during the summer and produced radishes in four weeks from time of seeding.

Long Black Spanish radish: A good one of the long kinds. Produced edible radishes in five weeks from time of seeding.

Lettuce: Morse, Hanson, San Francisco Market, Early Prize Head, California Cream Butter, and Philadelphia Butter were grown. Have had lettuce in abundance from June 1 to the present time. The curly leafed varieties did better and were more satisfactory than the Butter lettuce.

Early Red Valentine Dwarf bean: Seeded June 4; came up nicely and grew well, but did not form pods before the frost of August 25.

Davis Wax Dwarf bean: Seeded June 4; grew splendidly; by August 22 produced edible pods 6 to 7 inches long.

White Spine cucumber: Started in the hot bed in cans and transplanted to the open ground June 8; stayed alive all summer but made very little growth.

Improved White Plume celery: Seed started in window boxes; transplanted to cold frame after other things were taken out; has done well and is ready to blanch.

Early Jersey Wakefield cabbage: Transplanted June 8; grew well and began heading August 10; has done the best of any. Produced a number of good solid heads. Pressure of other work caused cabbages to be neglected, otherwise all varieties would have done better.

Early Flat Dutch cabbage: Transplanted June 8; grew fairly well and produced several firm round heads weighing 2 to 3 pounds.

Premium Flat Dutch: Transplanted June 8; grew well and produced several nice heads.

Brussels sprouts: Transplanted June 8; one-fourth of the plants grew nice sprouts.

Broccoli: Transplanted June 8; one-tenth of the plants produced heads 5 to 6 inches in diameter.

Siberian kale: Transplanted June 8; has done well.

Cabbage, broccoli, Brussels sprouts, and kale were seeded in the open ground June 4. With the exception of the kale none did as well as the transplanted plants.

GRASSES.

With a view to testing their adaptability to this climate the following grasses were seeded June 13 in plats 13 by 15 feet. The seed was old and several varieties did not come up well. The surface soil was also dry at the time of seeding and germination did not take place until rain had fallen.

Kentucky blue grass (*Poa pratensis*): A fair stand; made growth 4 to 5 inches high.

Redtop (*Agrostis vulgaris*): Good stand and good growth.

English blue grass (*Festuca pratensis*): Fine stand; grew 10 inches high.

Meadow foxtail (*Alopecurus pratensis*): Did not germinate well.

Tall meadow oat grass (*Avena elatior*): Thin stand, but some grew 24 inches high.

Orchard grass (*Dactylis glomerata*): Made a good sod.

Timothy (*Phleum pratense*): Grew very well, some 12 inches high.

Awnless or smooth brome grass (*Bromus inermis*): Did not come up well.

Tall meadow fescue (*Festuca elatior*): Did not germinate well.

Meadow soft or velvet grass (*Holcus lanatus*): Made a good thick soil.

Perennial rye grass (*Lolium perenne*): Grew 10 inches high.

White clover (*Trifolium repens*): Came up good stand, but did not grow more than 1 inch high.

REPORT OF WORK AT THE KENAI STATION.

By P. H. Ross, *in Charge.*

THE WEATHER.

The ground firmed sufficiently by May 9 to allow starting the disk harrow. As is the case every season, the ground had been miry for a time after the removal of the snow and the thawing of the ground. The drying progresses very slowly. When the surface is stirred it dries out quickly and becomes firm, remaining so the rest of the season. As usual, there was very little rainfall in May and June. It did not amount to 0.75 inch during the sixty-one days. During the whole summer the usual southwest winds were almost totally absent, and this fact, combined with a liberal rainfall in July and August, accounts for the rank growth of crops, the yield of hay being the heaviest of any raised at the station. There were but eleven clear days during these two months, and on thirty-three days during the same time rain fell in measurable quantities. In spite of the rainy weather all but a small percentage of the hay crop was saved in almost perfect condition. Last year the crop was put up with even better success. A detailed account of the methods followed to procure these results has already been published.[a]

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[a]Alaska Sta. Bul. 3.

NEW BUILDINGS.

During August, at rainy intervals, when haymaking could not be carried on, three new buildings were erected, consisting of a wood shed (8 by 14 feet), a blacksmith shop (14 by 20 feet), and an implement shed (14 by 20 feet). A quantity of sheet tin damaged by fire was procured from the Kussiloff cannery to be used as a covering for these buildings, and when this was given a coat of coal tar it served its purpose perfectly. A portion of the hay shed heretofore used as a blacksmith shop and an implement shed combined now gives room for a great quantity of hay.

CROPS.

All the cultivated land except a small area seeded to grasses, vegetables, and fruits was sown to field oats, it being the only grain grown at the station this year. The crop was not planted with the hope of seeing it mature, but the prime object was to raise feed enough for the stock. Haymaking began when the grain was in the milk. The following is a record of the growth on the different plats:

Field C, sown May 18 and 19; field B, sown May 24, 25, and 26; field A, sown May 27 and 28. June 15, field A, 2 to 3 inches high, fair stand; field B, 2 to 3 inches high, fair stand; field C, 3 inches high, fair stand. July 1, field A, 4 to 6 inches high, last year's application of manure indicated by increased growth; field B, 4 to 6 inches high; field C, 5 to 10 inches high, growth spotted. July 20, field A, 3 to 20 inches high; field B, 6 to 18 inches high; field C, 10 to 20 inches high. August 1, field A, 8 to 40 inches high; field B, 12 to 30 inches high; field C, 12 to 36 inches high. August 15, field A, 12 to 46 inches high; field B, 24 to 36 inches high; field C, 24 to 42 inches high.

Field C was very spotted, the greater part making a sickly, yellow growth. The yield of this field was less than 1 ton to the acre. In field A the area over which the stable manure was distributed last year showed a rank, heavy growth. On ground not so fertilized the growth was much lighter and thinner. Field B showed a good uniform growth, its yield of hay being estimated at 2 tons per acre.

GRASSES SEEDED 1903.

June 1: Timothy, 6 inches high, spreading. Meadow foxtail, 4 inches high; mixture partly winterkilled. Smooth brome grass, 6 to 8 inches high, has spread so that drills can no longer be distinguished.

June 18: Redtop 6 to 8 inches high. Timothy 8 inches high. Meadow foxtail 24 inches high, headed and in bloom. Smooth brome grass 10 inches high.

July 2: Redtop 12 inches high. Tall fescue 24 inches high. Timothy 12 inches high, Smooth brome grass 18 inches high. Meadow foxtail 24 inches high, fully headed.

July 20: Redtop 18 inches high. Tall fescue 24 to 36 inches high. Timothy 20 to 30 inches high, fully headed. Alsike clover in bloom, vigorous. White clover very short growth. Meadow foxtail 30 inches high. Smooth brome grass eaten down by cattle.

August 1: Redtop 30 inches high. Tall fescue 48 inches high, in bloom. Timothy 40 inches high. Alsike clover 18 inches high, going out of bloom. Smooth brome grass 20 inches high, not looking well.

August 15: Tall fescue 40 to 72 inches high. Redtop 30 inches high. Timothy 36 inches high. Meadow foxtail 48 inches high, very thin. These grasses were cut for hay August 24. No seed had ripened.

GRASSES SEEDED 1904.

June 1: Tall fescue 4 inches high. Tall oat grass 4 inches high, poor stand. Timothy 4 inches high. Smooth brome grass 6 inches high, spreading. Blue grass 4 to 6 inches high, doing well.

June 18: Tall fescue 8 inches high. Tall oat grass 8 inches high. Timothy 6 inches high. Smooth brome grass 10 inches high. Blue grass 6 inches high.

July 2: Tall fescue 24 inches high. Tall oat grass 24 inches high. Timothy 10 inches high, unthrifty. Smooth brome grass 18 inches high. Blue grass seed stalks 24 inches high.

July 20: Tall fescue 30 to 36 inches high. Tall oat grass 30 inches high. Timothy eaten down by cattle. Smooth brome grass eaten down by cattle. Blue grass 6 to 12 inches high.

August 1: Tall fescue 36 inches high, in bloom. Tall oat grass 40 inches high, in bloom. Blue grass seed stalks 36 inches high, in bloom.

August 15: Tall fescue 40 inches high. Tall oat grass 40 inches high, lodging. Blue grass 36 inches high. Smooth brome grass, which has hitherto been one of our most thrifty grasses, did very poorly this season, owing doubtless to the abnormally wet season.

GRASSES SEEDED 1905.

June 1: Native bluetop 9 inches high, vigorous. Native bunch grass 4 inches high, doing well. Timothy 6 inches high. Perennial rye grass winterkilled. Tall fescue just beginning to grow. Orchard grass just beginning to grow; partly winterkilled.

June 18: Bluetop 20 to 24 inches high, heavy stand. Bunch grass 12 inches high, heavy stand. Timothy 12 inches high, heavy stand. Tall fescue 5 inches high. Orchard grass 5 inches high.

July 2: Bluetop 24 to 30 inches high, very heavy, vigorous growth. Bunch grass 18 inches high, thrifty. Timothy 24 inches high, beginning to head. Tall fescue 6 inches high. Orchard grass 6 inches high, sickly growth.

July 20: Bluetop 36 to 48 inches high. Bunch grass 24 inches high. Timothy 24 to 36 inches high. Tall fescue 18 inches high. Orchard grass partly eaten by cattle.

August 1: Bluetop 36 to 58 inches high. Bunch grass 30 inches high. Timothy 24 to 50 inches high. Tall fescue seed stalks 36 inches high. Orchard grass 6 inches high, but few seed stalks, yellow.

August 15: Bluetop 48 to 60 inches high. Bunch grass 30 inches high. Timothy 40 to 60 inches high. Tall fescue 36 inches high, very thin. Orchard grass 6 inches high.

Seed was gathered from both bluetop and timothy. The bunch grass also matured seed, but as it is valuable only for grazing, no seed was preserved. The three grasses maturing seed were sown on soil well fertilized with barnyard manure. Timothy, which has not done well here when sown on unfertilized ground, showed splendid results when fertilized as above. Timothy growing as rank as this would, in the writer's estimation, yield about 3 tons to the acre. The native bluetop also gave promise of being a heavy producer of forage.

GRASSES SEEDED 1906.

Smooth brome grass, tall oat grass, redtop, meadow fescue, timothy, Japan clover, canary reed grass, and alfalfa were sown this season. The stand in each case was very poor and all made a poor growth throughout the summer,

regardless of a favorable season. This indicates poor seed. The brome grass and the oat grass made a better growth than the other grasses.

A small plat of ground was seeded to rape on May 28. This ground was unfertilized and the growth was very slow. It was sown too quickly, but when thinned out properly the growth was not much better.

A plat of well fertilized ground was seeded to 1,000-headed kale. The plants grew to a height of 2 feet, with broad succulent leaves, much relished by cattle. This plant seems to be valuable as a soiling crop.

HORTICULTURE.

The native currants set out last year made a good growth, but did not bloom or bear fruit. The currant, raspberry, and sweet briar plants received from the Sitka Station, and set out last year, did about the same. Native raspberries under cultivation for several years bore a light crop of fruit of good quality for the first time this season.

Potatoes: Four varieties of potatoes were planted from Sitka seed, viz, Garfield, Extra Early Ohio, Freeman, and Burbank. The Extra Early Ohio proved to be the best potato not only in yield, but also in size, conformation, and quality. The seed from this variety seemed to be more nearly matured than any of the others. Freeman ranked second, the Burbank third, and the Garfield fourth.

A small quantity of Extra Early Ohio and Garfield were planted in raised beds and fertilized liberally with wood ashes. These beds produced larger potatoes and of better quality than those planted in level ground and fertilized with stable manure. The potatoes were planted May 21 and dug September 20.

Peas: Alaska planted May 22 were large enough to eat August 25. Yield only fair.

Lettuce: Big Boston, Hanson, and Golden Stonehead were sown in the hotbed April 26 and not transplanted. All varieties produced immensely. This plant may be repeatedly cropped and will continue to send up a liberal supply of crisp, tender leaves throughout the season.

Celery: Seeded in hotbed April 26 and not transplanted. It was blanched by placing boards along each side and throwing earth against the same to hold them in place. The celery blanched nicely and was of good size and quality.

Parsley: Champion Moss Curled, planted in hotbed April 26 and not transplanted, made a splendid growth, over 15 inches high.

Edmonds Blood Turnip beet and Long Orange carrot, sown in open ground May 28, were very slow in coming up and grew very slowly after coming up. The carrots were almost a total failure, while the largest of the beets measured but 2 inches in diameter. Ostrich Plume mustard and corn salad planted the same time as the beets and carrots did very well, both making a good growth.

Cabbage: Early Flat Dutch and Early Jersey Wakefield were sown in the hotbed April 26 and transplanted to the open ground May 29. Of 100 heads set out but 70 grew. They grew very slowly at first, but as the rains became more frequent made a rapid growth and were heading nicely by August 26, when the greater portion of them were consumed by cattle breaking into the garden. The remaining plants produced solid heads of good quality.

Brussels sprouts: Sown in hotbed April 26 and transplanted to open ground May 29; grew well, but did not develop sprouts.

Broccoli: Planted in hotbed April 26 and transplanted to open ground May 29; grew well and formed a good percentage of heads. The heads were purple in color and not large in size.

Onion: Large Yellow Danvers, sown in hotbed April 26 and not transplanted, produced bulbs 1 inch in diameter.

FIG. 1.—PART OF STATION HERD, KENAI STATION.

FIG. 2.—GALLOWAY COWS, KENAI STATION.

FIG. 1.—COMMON STEERS, KENAI STATION.

FIG. 2.—A SO-CALLED NATIVE COW, KENAI STATION.

Rhubarb: This vegetable has invariably done well since it was started. Keeping the seed stalks cut down allows the plant to keep growing and keeps the stems crisp and tender until frost. The plants at this station are grown in raised beds.

EXPERIMENTS IN SOIL INOCULATION.

This station last spring received soil-bacteria cultures from the Bureau of Plant Industry. These cultures were for use on the garden bean and pea and red clover. We have no red clover at present, so the red-clover culture was used on alsike. The peas had been planted and some beans were planted purposely for this experiment. The directions were carried out to the minutest detail in preparing solutions of the cultures and the characteristic cloudy appearance was obtained in each instance.

In the case of alsike neither the seed nor the soil could be inoculated very conveniently, so the culture was sprayed on. Nodules were already present on the roots of the alsike, but their growth was not aided in the least by the soil culture.

A small plat was sown to beans inoculated with the bacteria culture alongside a similar plat sown to beans uninoculated. No nodules developed nor was there any noticeable difference in the growth of the plants.

In the case of pea the soil was inoculated according to directions. No nodules developed and no difference could be detected in the growth or yield.

LIVE STOCK.

Since the last report a good team of horses has been procured to take the place of the yoke of oxen heretofore used. The short growing season and wet harvest time require that a great deal of work be done in as short a time as possible. The horses are an invaluable aid.

Last spring a shipment of Galloway cattle was received, consisting of five cows, a bull, and a calf. (Pl. VII, figs. 1 and 2.) These cattle arrived May 13, after a long journey of two months. The cows were milked regularly throughout the entire trip, but were practically dry when landed. With the exception of one cow that was totally dry, the milking was continued, to keep up the milk flow as long as possible. The calf was allowed to run with its mother until late in July, when it was weaned and the cow milked. These cattle have taken kindly to the place and have done well on summer pasture.

Ten head of cattle were wintered and a record kept of feed consumed for a period of ten weeks. For a time during the forepart of the winter the feed was taken from a stack outside; and as it was frequently wet with rain and snow, weighing was impracticable.

Three cows were in milk during all or part of the period of weighing the feed, and their records show that the cow giving the most and richest milk ate the least.

Three calves were dropped during the winter, one of which died a few days after birth. The others were fed on skim milk and what oat hay they would eat and weaned at 4 months of age. Their horns were successfully suppressed by an application of concentrated lye when 4 or 5 days old.

Six steers and a cow and calf have been sold to make room for the pure-bred stock. (Pl. VIII, fig. 1.)

DAIRY WORK.

A fairly complete dairy outfit was received last fall, consisting of a small vat and cheese press, a churn, a butter worker, a milk tester, and a supply of sulphuric acid and other accessories. The separator arrived last spring. It

is a small hand-power tubular machine. Under favorable conditions it does very good work, skimming as close as 0.02 of 1 per cent.

The churn is of barrel shape, of 15 gallons capacity. The butter worker consists of a sloping triangular bed, at the apex (lower end) of which a long lever is attached which reaches across the whole length of the bed and is operated by hand. The outfit is of sufficient capacity for the work required of it here, and some excellent butter was made during the summer. A party of hunters purchased a supply late in July, and at the end of a six weeks' hunt reported the butter which remained to be in excellent condition. This speaks well for its keeping qualities.

The cheese making was not attended with such unqualified success, although some very good cheese was made. There is no dairy building; consequently the work must be carried on in the house. It is impossible to cure cheese perfectly in a dwelling house, especially during the summer. It was noted that cheese made early in the spring was of better flavor than that made during the summer. There is no doubt that the best of cheese can be made provided suitable quarters are provided in which to carry on the work. It is a significant fact that never under any circumstances does the milk develop undesirable flavors. Good milk is the foundation of all good dairy products.

The milk tester is a 12-bottle hand-power machine. The milk from each of the cows was tested once a week and a record kept of same.

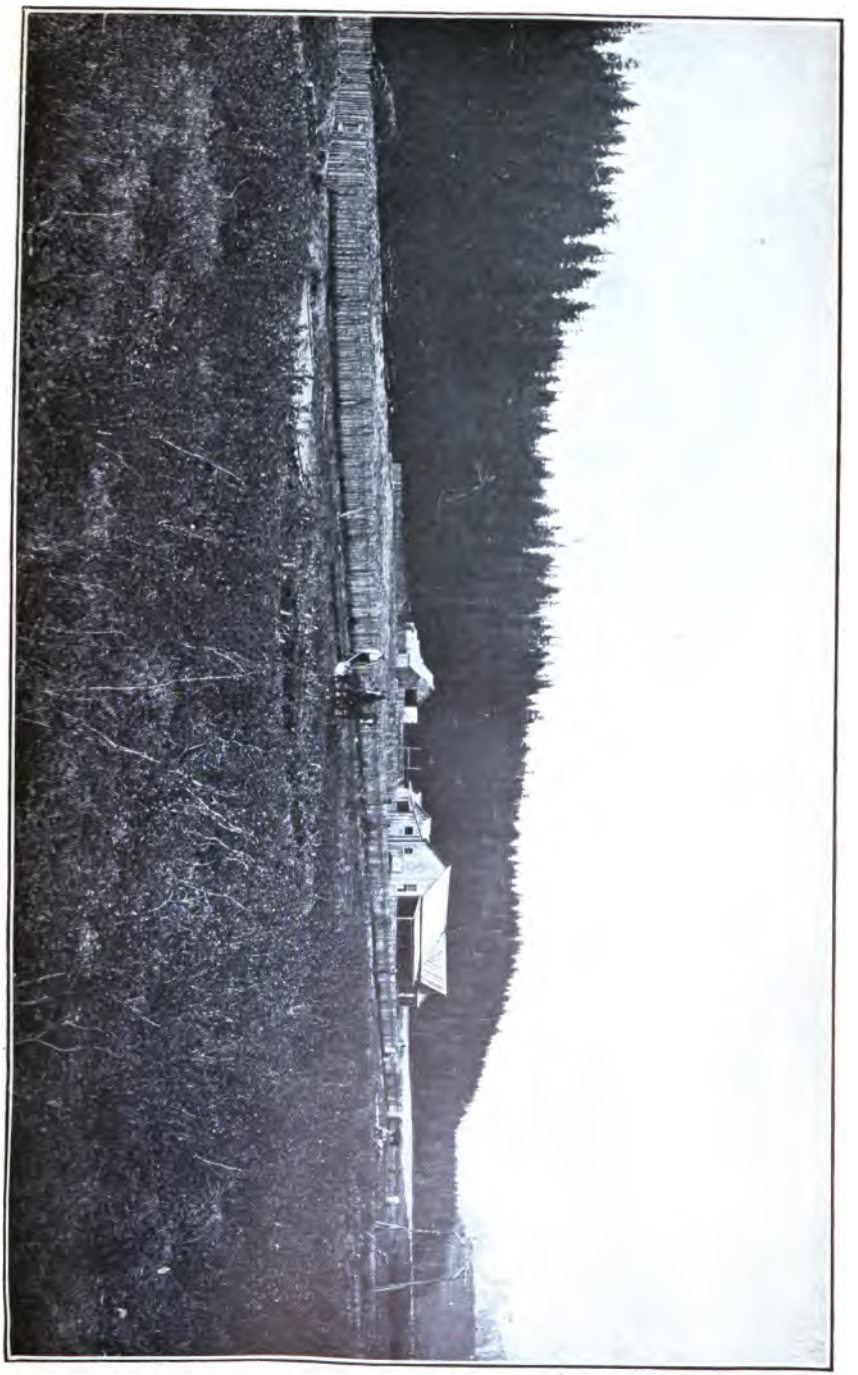
REPORT FROM MR. J. D. JOHNSTON.

Mr. J. D. Johnston, of Bear Lake, near Seward, Alaska, has sent an interesting report, which is submitted herewith. Mr. Johnston is a bona fide farmer and is making a success of his business. He took up a homestead a few miles from Seward two years ago and is now comfortably settled. He will soon have 60 acres under plow and in pasture, and his experiments with grasses will be of value to all farmers in that region. He has kindly sent views of his place, one giving a general view of the ranch. (Pl. IX.)

BEAR LAKE, SEWARD, ALASKA, *October 30, 1906.*

DEAR SIR: It gives me much pleasure to give my first annual report. I have been on my place now two years, but the first year I was employed by the Alaska Central Railroad and did no farming; only built a house and barn. Last spring I came home and have been on my farm all summer, and am much pleased with the results of my labor. My place is glacier wash, with only small brush of alder and willow. My two sons and I have slashed over about 60 acres. Have 11 acres under plow. Last June we burned about 30 acres of old logged-off land and seeded it down to timothy, which now stands 6 inches high and is as green as in the summer. This shows that tame grass, timothy or clover, will give at least six weeks more pasture than native grass, as native grass was yellow here in the middle of September. I grew a garden from the seed you sent me, also from seed I got from Seattle. My radishes, lettuce, carrots, beets, rhubarb, and potatoes were very good. Would average fairly well with such as I have grown on Puget Sound. I planted three kinds of peas—Earliest of All, Little Gem, and Alaska. Alaska I received from you and they gave the best results. My cabbage was a failure. They were nice plants when I set them out about May 20, but they did not grow well. Grew slowly; just commenced to make head this fall. I plowed one-half acre and sowed turnips broadcast about June 15, but they did noth-

PLATE IX.



J. D. JOHNSTON'S FARM NEAR SEWARD.

ing. Clover that I planted in the fall of 1905 I have cut twice this summer, which shows that I can cut two crops of clover here for silage.

Last spring I received a bill of trees and shrubbery from Bellingham. I planted them as soon as the snow went off. I will give you results: One hundred plants each of strawberries, currants, Logan blackberries, raspberries, gooseberries, common blackberries, also three Evergreen blackberries. Every one of the strawberry plants grew lovely, just as well as on Puget Sound. Some bloomed in July and bore a few berries. My vines are as large and healthy as you will see anywhere. Next to the strawberries were the Logan blackberries. They are fine, grew about 3 feet of wood, and are dark green and healthy. Next comes the currants. They did fairly well; made about 18 inches of wood. Gooseberries did well. Raspberries which grew did finely, but only about forty out of one hundred lived; but I have some that sent up new canes 4 feet high. My Evergreen blackberry did finely; all three roots lived and grew just as nicely as in Washington. I also got Early Transparent apple trees and Siberian crab apple, and both grew about 3 feet of wood.

My family and I are great lovers of roses; so I included in my bill twenty-five rose bushes, twenty-three of which grew and are as nice as can be. Some bloomed this summer. Lilac bushes also grew well. I got honeysuckle and English ivy. The honeysuckle died, but the English ivy grew well.

I must speak of our chickens. Last winter, in February, I sent an order to Seattle for 4 dozen Plymouth Rock pullets. In due time they came, and a nice bunch they were. In a few days they commenced to lay eggs, and they have laid all summer. Some set; so we have raised 168 young ones and sold $20 worth per month of eggs in Seward. If all goes well till February 1, each hen will clear above her feed $4. That is good enough. I have kept cows for the last two years. I keep the Durham breed. They do well here for being kept on wild grass. I will expect better returns from them next summer, when I can pasture them on timothy.

Yours, truly, J. D. JOHNSTON.

REPORTS FROM THE SEED DISTRIBUTION.

Fred Patching, Loring, November 7, 1906.—The season was not a very favorable one for vegetables, being too damp and cool, but our garden did fairly well. (Pl. V, fig. 2.) Cabbage, as usual, made a good growth, but not as good as last year. Early Jersey Wakefield was headed and ready to use July 14; heads were of fair size and solid. All Seasons was a little later and made fine, solid heads, some of which weighed 15 to 18 pounds. Marblehead, Mammoth, Drum Head, about one-third headed, but the heads were not as solid as All Seasons. Table beets did fine, making well-shaped roots of good size and fine flavor. Stock beets did not do so well, and about one-half went to seed. Carrot, Half Long Scarlet Nantes, did extremely well, making fine, large roots of excellent flavor. Danvers did fairly well. Cauliflower, Early Erfurt, did not do any good. Celery, Giant Pascal, grew very slowly and did not make a very large growth. Cutling did extremely well and grew over 2 feet high. Celeriac, Large Smooth Prague, did very well. Horse-radish grew well, but the roots were not a good shape. Leek, Monster Carentan, did splendidly, making large roots of excellent flavor. Onion (seed), White Portugal, did very fine, some roots being over 3 inches across. Parsnips, White Dutch, probably did better than anything else in the garden this year, and many—in fact, most of them—were over 18 inches long, some being 2 feet. Radishes and lettuce did fine. Salsify did very well. Spinach grew well, was tender and of very fine flavor. Ruta-bagas, American Purple Top, made fine growth, were fine flavored, and

were not at all woody. Turnips, Extra Early White Milan, were as fine as I have ever seen, and one left till late weighed 8¾ pounds. Peas did fine, yielded well, and of fine flavor. Of flowers, roses, sweet peas, marigolds, Sweet William, violets, daisy, carnation, fuchsia, double daisy, and geraniums all did very well. I have taken a photo of some vegetables and will forward you as soon as printed. Potatoes did not do as well as last year, as the ground that raised 78 sacks last year only raised 43 sacks this year. The potato ground was not fertilized at all. All other ground was fertilized heavily with fish and stable manure.

S. F. Shepherd, Mary Island, Ketchikan, November 30.—Our garden is situated on the west side of Revillagigedo channel, at the water's edge, land sloping slightly north and east, and swept by the cold prevailing northeast winds; notwithstanding this disadvantage we have had a very fair garden. Most of the vegetables raised were from seed from the Sitka Experiment Station and sown at different times.

March 24, sowed in drills, even with the ground, peas, beets, and parsnips. Peas and parsnips did well, but about all the beets went to seed in consequence of being planted too early and in too wet ground.

Most of the garden was planted the middle of May and, with the exception of onions, did fairly well. Began to use lettuce and radishes in June; peas the middle of July; potatoes also in July. Started some very good cucumber vines, but the rain spoiled the blossoms so that only a few very small cucumbers developed.

Ruta-bagas planted early grew to weigh, on the average, 3 pounds; very sweet and excellent flavor. White turnips, small. Purple Top turnips, about 4 inches in diameter and fine grained, with delicate flavor. Carrots sown middle of May did well, averaging 3 inches in diameter. Beets sown at the same time did not grow large, none larger than 2 inches in diameter. Potatoes and all seeds sown the middle of May did the best.

During the season eight kinds of lettuce were sown; Giant Glacier and Henderson New York did the best, making fine large heads. I planted three kinds of peas. Marrowfat vines grew 9 feet high, and we fail to know how much higher they would have gone, as the bushes that supported them broke down. Early Alaska did the best, producing large, well-filled pods. Set out cabbage plants June 9 on new ground, using but little fertilizer. They grew very well, making solid heads, but mostly small, none weighing over 6 pounds. Cauliflower, on same kind of ground headed nicely. We also have a fine bed of kale. The cabbage, kale, and cauliflower plants were started in boxes set out of doors in a sheltered place.

May 24 we set out eight small fruit trees, three currant bushes, and eleven raspberry bushes. Three of the trees were Yellow Siberian crab apple, two Florence, and three Yellow Transparent apple. The crab and Florence made a growth of 18 inches. The apple did not do so well. The currant and raspberry made a good start. These fruit trees and bushes were sent from the experiment station at Sitka. Scotch broom seed planted May 1 made a growth of 2 feet. May 23, set out fifteen 1-year-old rhubarb roots; they produced plenty of fine large stalks. June 15, planted rhubarb seed, which made a growth of 12 inches. Horse-radish planted in various places, experimenting in different kinds of soil, seemed to do equally well. We have about one hundred red raspberry bushes growing, fifty set out in December, 1905, and fifty in February, 1906, all doing well, but those set out in February doing better than the others. Our strawberry plants did well, producing berries about the size of those grown in Washington and Oregon. Sunflowers planted May

30 grew 6 to 8 feet high, bloomed nicely, but rain spoiled the blossoms. Sweet Williams, carnations, pansies, mignonette, nasturtiums, and many free flowering annuals do well here. Nasturtiums, which we took pains to train, grew 12 feet high and were filled with blooms the whole season until killed by first freeze, December 4. The ground here is new, having been spaded this year for the first time. Had but little fertilizer to use on it. What we did use was ashes and seaweed and a very limited quantity of dogfish. Shall not use fish after this year, as I am told that after a few years the soil will not retain moisture owing to the fat in it.

Our neighbor, Mr. John Carlson, in the same locality, had an equally good garden.

The season has been very wet, having very little of what might be called growing weather, yet we are quite satisfied with the results of the first year.

Mont Galvin, Point Retreat Light Station, October 29.—Beets seeded in drills April 25 came up May 17. Made good-sized beets. Used last of them this month. Beans sowed same time took a month to germinate. Grew about 6 inches. Did not bloom. Broccoli seeded in open ground April 1 came up in ten days. Transplanted May 20, but did not grow scarcely until July 1; commenced to head September 1; made very large heads. Some are growing yet; look better than cauliflower and are more solid. Carrots seeded in drills May 25 came up June 5 and grew to a good size, short and stubby. Corn salad sowed on August 1 came up the 10th and is doing well. Will cover with grass later and preserve for spring. Cress sowed April 12 came up eight days later; grew the fastest of any plants I had. Pulled out July 1, as the plants commenced to get old. Asparagus seeded April 25 in rich soil, but did not germinate. I must have overheated it in water.

Siberian kale seeded in open ground April 1 and transplanted May 17 grew big and fast; did not head, but made leaves 4 feet long. Mustard seeded April 1 was in bloom June 15. Pulled out July 1. Got old and woody. Mint made a plant 2 feet in circumference. Parsley seeded April 1 did not come up until May 15. Transplanted July 1. Did well; made large leaves and is growing yet. Parsnips seeded in drills May 1 came up May 20. Did well; some were 14 inches long and from 2 to 4 inches in diameter. Ruta-bagas planted May 1 commenced to thin June 1; kept pruning the leaves all summer; grew fast and quite large. Rhubarb seeded April 20 came up May 10 and did well, making leaf stalks 16 inches long. Radishes seeded April 15; commenced to use May 20. They grew better than the other kinds of radish seeds I had.

Apple trees planted May 17 kept sprouting and made stems 8 to 14 inches.

Currants planted same date kept growing until August. For some unknown reason they commenced to decay. Made new sprouts from 4 to 7 inches long, but did not grow any after August 10. Raspberries planted same date; did fairly well, but did not seem to follow up the growth. Made stems from 4 to 6 inches long. Salmonberries planted same date; two never sprouted, while the others did well; made new stems from 5 to 8 inches. Gooseberries planted same date did not seem to catch right away. Started to sprout July 1; made stems 12 inches, while the others made from 5 to 9. They were the best of the lot to grow and are still holding out.

C. E. Peterson, Sentinel Island light station, October 16, 1906.—I received several kinds of seeds from you and seeded in the hotbeds for the first time. Results are as follows:

Cabbage, Early Jersey Wakefield, Flat Dutch, and Drumhead, sown in hotbed April 20, were transplanted May 28. October 1, out of twelve plants, I realized ten good solid cabbages, Flat Dutch doing the best. Wakefield did not do so

well; two out of four went to seed; balance very good, averaging 8 pounds, crisp and tender, the finest I ever ate. Cauliflower, Early Paris, did well. Brussels sprouts, German and French, did not do well; went to seed. Kale, Scotch and Siberian, both did well. Celery, slow, but very good; 10 to 18 inches high, but not bleached yet. Rhubarb, slow, but doing very well after I removed the cutworms from the roots. Broccoli all went to seed. Peas, out of your seed and the seed I had from Detroit, Mich., Thomas Laxton did the best, though late; American Wonder did not do so well this year; your peas did not pod at all, only bloomed. Beans, Valentine and Black Dwarf, did not pod; grew only 4 inches high, although planted on good manured ground. Turnips, Purple-Top Strap Leaf, did not do well; spongy and small. Ruta-baga, Champion and Thorburn, Thorburn doing best, but small. Carrots, Chantenay and Scarlet Horn, Chantenay doing best; small, but good. Asparagus did not even come up; for what reason I can not tell. Parsley, curled and plain, both doing well. Cress and mustard doing well and up early. Parsnips not doing well this season; long roots, but no body to them.

Potatoes did well this year, some weighing 24 ounces, but rather watery. Fish and rock weed used for fertilizer; but as I planted them in ground that has never been turned before, I think I did exceedingly well, and, on the whole, I am well pleased with my year's results.

The apple seedlings you sent me a year ago last spring I transplanted to deeper ground, and they are all doing well. The two Duchess, Borovinka, and the Red Astrachan died out last winter, but the balance of them, six in number, are all doing well and look healthy. The raspberries, also, I had to transplant. Out of five I saved three. Two have berries late in August. The red currants have berries, almost a teacupful from one bush 4 feet high; very good. Any kind of berry will grow on this island.

Flowers doing well, although late on account of the wet season. Sunflower 46 inches high, but did not bloom. Carnations did not bloom.

Andrew Jackson, Point Sherman Light Station, Lynn Canal, September 30.—I duly received the vegetable seeds and nursery stock that you kindly sent me last spring, for which please accept thanks. The vegetable seeds proved to be of good quality, as none of them failed to germinate. This has been an unusually bad summer for Lynn Canal, so that only a few of the hardiest vegetables would grow. Potatoes, turnips, ruta-bagas, peas, radishes, and rhubarb did fairly well.

I could not even grow good lettuce without the aid of the cold frame. I planted sweet peas in a box about May 1 and transplanted about July 1. The sweet peas were then about 4 inches high and they are still only 4 inches high. Last year I transplanted flowers in the same place on June 7 and had a nice flower garden. This year it has been a total failure, but in spite of the bad weather I could grow most all of the vegetables by using a cold frame. My potatoes did fairly well, as I only planted potatoes that were bought for table use from Astoria, Oreg. They are of good quality and about five of the best hills will fill an ordinary water pail. Potatoes that had good strong sprouts when planted about May 15 did by far the best.

The following nursery stock was received in good order and set out: Apples, 2 Florence, 3 Yellow Transparent, and 2 Siberian crab; 3 red currants, 3 white currants, and 5 raspberry plants. The Siberian crab has done by far the best this summer, making a growth of about 14 to 16 inches; then next comes the Florence with about 10 inches, and the Yellow Transparent, making only a few leaves. Two of the red currants died this summer, but the one left is getting along nicely. The white currants are doing very little growing, but the raspberries are doing nicely.

Gust Grundler, Douglas, October 23.—The following is a report of my experiment in gardening for this season: The cabbage maggots were worse this year than last year, destroying all the cole crops. I only had about 30 plants left out of 300. I received some circulars from the Bureau of Entomology, Washington, D. C., advising me how to treat maggots if they should appear again. As we had much rain here this season, the plants grew finely all summer and started to head; then we had a few warm days in July and all the plants started to wilt. By investigating I found that all the small roots were eaten off. I found as many as 40 maggots on one plant. Ruta-baga plants and turnips were also full, and so I thought the best remedy for them would be to pull them out and pour boiling water over them, killing all the maggots. I also used coal oil for killing maggots. As the maggots were so numerous I thought it would be too late to use any of the remedies advised in the circular. A man who is working a farm a few miles from here lost 600 plants out of 1,800. As soon as he found out he had maggots on the plants he boiled soap to the thickness of sirup and poured it down the stalks. A few days afterwards he used some linseed oil in the same manner as he did the soap. He claims he saved a great many plants. I used some sulphur again, but with no results. I had about fifteen heads of cabbage left. Early Jersey Wakefield made fine solid heads. Early York the same.

Kale, Dwarf Green Curled Scotch, did finely; also Siberian kale, but the latter grows too low on the ground. Cauliflower, Extra Early Snowball, got a few fine heads. Broccoli, most of the plants sent up seed stalks before the maggots attacked them, and what was left made small heads. Brussels sprouts, only four plants left, but they did finely. It made enough for a meal. Carrots, Golden Rod, were fair. With beets I had no success. Plants transplanted from hotbed sent up seed stalks. Sown in open ground in June did not get large enough to be any good. Onions do not grow here from seed. Beans, Lazy Wife, grew about 2 feet, but did not bloom. Peas, Alaska and Maule Extra Early, were both fine, giving a good return. Celery, White Plume, plants grew very slowly, did not get large enough for table use. Of rhubarb, Victoria, I got about fifty plants out of one package of seed. I transplanted them and they grew very well. Old plants did very well. I had six cuttings from them. Asparagus, Conover Colossal, I am experimenting with, I have some good-looking plants, but next spring will tell what they are worth. Lettuce, California Cream Butter and Salamander did well. Maule Immensity grew very large, but was tough. Radish, The Leafless and Early Scarlet Turnip, did well in the early part of the spring. I can not raise any during the summer on account of the maggots. Peppergrass grew very well, but is little used.

Strawberry plants I had from Seattle were very badly injured by frost, but they recovered better than I expected, and I had some fine berries. I also had some plants growing which I got from a garden here. They stood the frost better and grew into big bushes, but as they did not bloom for two years I pulled them up. I have seen the same in other gardens, and I wish somebody would tell me the cause of it.

The apple trees set out last year grew well—12 to 24 inches. The plum trees are making fine trees also, and I expect them in bloom next spring. Cherry trees did not grow at all. I transplanted them and I found that they had not a single new root grown in two years, but they are still green and had some leaves.

The apple trees you sent me this spring are all growing except one Yellow Transparent. The others and Siberian crab apple grew from 8 to 12 inches.

Florence crab apple grew 24 inches. Currants and gooseberries planted last year grew well, but did not bloom. Raspberries had a few berries on. All the berry bushes planted last spring are doing well.

Potatoes, Early Rose, grew very well. I had some fine potatoes. I also planted some Freeman Early, but they did not do well. I think they grow better in a dry climate.

J. C. Burgess, Chilkoot Cannery, Haines P. O., October 2.—The crab apple, currant, and raspberry bushes sent me last spring were duly set out and have made a phenomenal growth, considering everything. First they were kept about a week at the Columbia Cannery store near a stove until the buds were bleached white. All lived except one or two. Then I planted peas near them, as I thought, of the dwarf variety, and of course they somewhat smothered the bushes; however, I think it caused them to take root better on account of the peas.

The vegetable seed all came up finely and all did well, except broccoli, which grew finely, but did not form any heads. Beets inclined to want to go to seed. Kale did finely. Brussels sprouts just having nice sized heads coming. Cucumbers were planted in barrels sawed in half and filled with rich soil and manure, I think I made a mistake in not boring holes in the bottom of the barrels for drainage. But the season was too cold and rainy. They were a failure. Turnips are wormy. Ruta-baga was fine, also parsnips, carrots, rhubarb, peas, celery, lettuce, and radishes.

I had about 1½ tons of fine potatoes, Early Rose and a large white potato.

B. F. Hefele, Skagway, July 1.—The trees which I got last year are all dead in spite of my taking the best of care of them. Three apple trees are alive—one Yellow Transparent, one Borovinka, and one seedling. They were pretty weak when I got them and have been so all the time. The raspberry and the currant bushes came finely, and wintered without any trouble, in spite of it being a very cold winter. I lost only two currant and one raspberry bush. The latter seems to be the hardiest of them all. All the trees which I got this year are doing well. There are seven apple trees, whereof the Yellow Siberian stands first. The three white and four red currants are coming on finely and the spear of mint is doing well. Last year's raspberries are bearing already and have good healthy shoots for next year, the assurance of plenty of berries.

The vegetable seeds planted, lettuce, peas, beans, turnips, radishes, and beets, are doing fairly well, considering the poor weather we are having this year. Until now we have had very few warm days.

George Blanchard, Skagway, October 22.—Vegetable seeds just received, and thank you for same. The apple trees, currant, and raspberry bushes received from you this spring have done very well. The raspberries have grown large and had some fruit. The currant bushes also grew well, but had no fruit. The apple trees, with the exception of one, have done splendidly, and this winter will tell how they will be able to stand the cold. Am going to manure them and cover them up and hope they will pull through.

F. H. Partridge, Hoonah, October 29.—I received a fine assortment of vegetable seeds last spring, and another assortment for next year arrived in the last mail. Thank you very much for them. Your assortment of currant, raspberry bushes, and apple trees arrived in first-class condition, and I planted them in gravel that has a large percentage of black mold. I placed seaweed and fish guano under them, but the flies got in their work with the guano, and the maggots completely destroyed the raspberry bushes and two of the currant bushes. The apple trees survived, but did not grow any; neither did the remaining currants. I found that guano used on any crop will attract the flies, and unless it

is placed deep and thoroughly mixed with the soil it will damage and sometimes ruin the tender roots of the plant. I think, to be successful, guano should be used in the fall, and then it will be more readily assimilated by the plants next year. There is no question as to its value as a crop producer.

I excavated some slate shale from the side of a bank in the summer of 1904 and planted a few seeds on it, and nothing would grow; but this year on the same plat of ground I used guano, and the result is marvelous. Lettuce, radish, mustard, Purple Top Strap-leaved turnip, and Cow-horn turnip grew rank, and of the most delicious flavor of any that I ever tasted.

Flowers, too, were something wonderful. My collection was nasturtium, sweet alyssum, mignonette, California poppy, morning glory, and sweet pea. The latter grew rank, but owing to there being no sunshine there was no bloom.

Plat No. 2 contained Savoy and Early Jersey Wakefield cabbage and Alaska peas. They all did remarkably well, considering the soil was nothing but beach gravel with guano as a fertilizer. I am satisfied the Alaska pea is all right for this climate, as there were peas large enough to eat by the last of August.

Plat No. 3 was planted to parsnip, carrots, beets, Purple Top turnip, rutabaga, and Brussels sprouts; also a few onion sets. The soil was a dark loam with a silt mixture; fertilizer, guano. Results, considering the cool, wet weather, were truly surprising. The seed was planted just before the dry spell in the spring. They sprouted all right, but being so near the surface, about two-thirds of them failed to take root, but those that survived grew very rank. I harvested more vegetables than I can possibly use this winter, even after selling over one-half of them. About 90 per cent of the cabbage formed nice, solid heads.

My experiments have taught me the value of seaweed and fish guano as a fertilizer, and I believe that farming in Alaska can be made a paying proposition if one farms the same as they do in the States—with a team. Selection of soil is a factor that is to be considered of great importance. I prefer soil at the mouth of some stream or creek, where there is a wash dirt or silt, as vegetables seem to do better.

C. F. Stites, Sundum, December 10.—I write to let you know that we can raise potatoes here as well as in Skagway. I have the Gold Coin. I had almost given up until I got them. For some years I did not get my seed back of other kinds. Last year I had all Gold Coin but one sack.

I had in cultivation 28,000 square feet, about one-half of which was new ground, which I could not do much with, as it was heavy sod, so I just turned it over. Every third row I put seaweed, and seed about 1 foot apart. I could not hoe it much, for sod was too tough; but I got 110 sacks of large potatoes and 10 sacks of small ones. The largest potatoes weighed 1½ pounds, and the product of one hill weighed 8 pounds.

From about 1,000 square feet of old ground I dug 7 sacks September 1. The first were big enough to eat July 15, and I took five sacks to Juneau August 1.

The apple trees you sent me two years ago made about 18 inches growth last summer. Most of the berry bushes have died.

Ole Martin, Seward, October 29.—Rhubarb, Victoria, planted in boxes May 1 and transplanted June 10 was large enough to eat August 15. Kale planted May 1 and transplanted later; had kale all summer. Mustard, Ostrich Plume, did fine. Brussels sprouts, trench grown, did fairly well. Cabbage, Early Jersey Wakefield, about 25 per cent of them did fine. Parsley, Champion Moss Curled, grew about 8 inches high. Parsnips, Hollow Crown, a fair crop. Turnips, Purple Top White Globe, the largest weighed 3 pounds; average, 1½ to 3

pounds. Peas, Alaska, large enough to use the middle of August. Carrots, Scarlet Horn, as good a crop as could be grown. Beets, Edmonds Blood, about 4 or 5 inches in circumference; fairly good. Ruta-baga, Purple Top American, average, 1½ to 2 pounds. The porcupines have been very troublesome. They eat everything that comes in their way.

Potatoes, Early Rose, out of 350 pounds got 600 pounds. Turnips, raised 20 sacks. Ruta-baga, 18 sacks.

Red raspberries made a growth of 1½ feet. The white currants and apple trees made a good growth. The apple trees from 1905 are doing finely. The porcupines destroyed two of them. Will fence them out this winter.

Flowers—had the finest display you would wish to see in Alaska. Mint also is doing fine.

Clover and timothy grew 3½ feet tall. Oats, a little plat 30 by 40 feet, was cut October 10 for green feed, as it did not ripen; also a little barley planted May 28 did not ripen.

Can not say much about the rest of my seeds, as my garden is new. Have about 2 acres under cultivation. Have a dwelling house 12 by 22 feet, cellar 12 by 20 feet, double walled; also a wood shed and tool house.

Curtis P. Coe, Wood Island, Kodiak, October 30.—In response to your request I submit the following report of agricultural work at the Kodiak Baptist Orphanage for the past spring and summer:

The spring opened early. The frost was out of the ground in sandy places in early March, and on March 16 we plowed one of our gardens, and the next day planted kale, onions, peas, lettuce, endive, carrots, and parsley. From none of this planting did we receive returns worthy of mention.

On March 29 we planted a sandy field which we have been experimenting with for several years, trying to find something that will grow. This time we tried vetch, peas (Canada field), alfalfa, mammoth clover, red clover, oats, and spurry. Each of these kinds of seeds, except the last two, had been treated with the nitrogen culture adapted to it and sent by the Government. The results were not at all satisfactory, as the yield was next to nothing. However, this field has not been productive in the past, except in very rare cases. There was evidence of a slight improvement over legumes tried formerly. Many tests of the cultures indicate a little value in their use.

The same kinds of seeds were tried in different soil, sowing them the same day. The oats and vetch did much better and were cut for hay in September.

April 28 potatoes were planted on ground plowed March 16 and which two weeks before planting had received a liberal amount of potato fertilizer purchased in Seattle of a reliable firm. The seed was partly imported for planting. The yield was not more than three times the seed planted. On this same land a few years ago we raised potatoes that yielded at least at the rate of 200 bushels to the acre. Potatoes were tried at three other places, the fertilizer being used in each case, but the results were no better. Others in the vicinity have had better success than usual this year with potatoes.

The only vegetables which have made much of a return for seed and labor have been carrots, lettuce, salsify, and radishes. All others have failed. Cabbage and cauliflower failed because the cattle broke down the fence when they were just making heads and feasted upon them.

One cause of the failure, I believe, was the cold rainy weather in July and August, making it almost impossible for vegetables to make a satisfactory development.

Our cattle have done very well. Six cows calved in the spring, and all have done well all through the summer. The yield of milk has not been so large as formerly, but has been satisfactory, as they have averaged considerably more

than 3,000 pounds of milk each in the last six months. We have eighteen head all told.

Our goats have not done so well. A year ago last summer two old ewes were lost, and in the fall two young ewes were also lost; then this last spring two kids, also ewes, failed to pull through the first few days. The loss of the old and young ewes was, I think, by the tide catching them on the beach at some place where they were unable to climb the cliffs. We now have three ewes and two bucks.

A year ago I sent to Washington and purchased a pair of thoroughbred Berkshire pigs. They have grown well and have been well and hearty. They have cost little for feed. At 1 year of age, August 3, the sow had a brood of eight, seven of which lived and are now fine shoats. The original boar at 18 months will dress over 300 pounds, and the sow would dress over 200 pounds. I have sent for another young male that there may be no necessity for in-breeding.

Chickens have done very well, at least in raising the young. The eggs hatched very poorly, but I find others had similar trouble. Of about 150 hatched, mostly by incubator, we raised 130 in homemade brooders. Some are Black Langshans, others Barred Rocks, and the rest are just chickens. The egg production has been rather below the average, but we ought to have plenty of eggs this winter and next spring, as all old hens have been disposed of and the flock now is young, hearty, and thrifty.

We started the year with 3 Pekin ducks, but after eating quite a number and selling others we have a fine flock of 20. In ten weeks the young ones were as large as the parent birds. They make a very rapid growth and are most excellent eating. I have wanted to try geese, but one purchase of native birds proved to be all ganders. The kind I have wanted—the Gray African—is hard to procure in the West. A fancier in Washington quotes them at $25 per trio. I will have to get along without them at that price.

The Galloway cattle which were received May 1 have grown rapidly and have increased in weight at least 50 per cent, and I think more. The bull at 2 years of age was about the size of a native bull killed recently which dressed 650 pounds. The Galloways are gentle and kind.

Experience has proven again that the silo is a necessity to anyone who wishes to raise cattle in this part of the country. The weather during haying time was very wet, and hay has been hard to make this summer. The silo, however, can be filled at all times. Mr. Rier, superintendent of Frye-Bruhn's ranch, informs me that he can put up ensilage for less than $1 a ton. He has several silos near the beaches which produce the beach grass. We have to boat our grass 6 or 8 miles, but find it a cheaper food than hay. A silo for storing at the beach is contemplated, as we have much fine weather in the fall after the grass is too tough to be good.

Most of the small fruit and fruit trees sent out by you have lived and grown. The raspberries have made the best showing; the canes are 6 feet high, and this summer they bore a handful of fruit.

Alex. Friedelin, Afognak, October 7.—Arriving home from beach mining on May 24, although late, I commenced to work on my gardens the next day and continued until I had all seeds sown and planted in the ground, and finished on June 12.

Cucumber is one of the very important articles of food amongst people of northern Europe. It is put up for winter use in big barrels, is salted down together with black currant leaves and dill, and would be a desirable article to have in Alaska for winter use.

I have been trying to raise cucumbers for many years, but without success. Last year I made a bed of thickly packed kelp covered with earth, the same as they do in Siberia, but using manure instead of kelp; planted seeds (Arlington White Spine) on June 3. They came up fine and started to grow vigorously; but after a while the leaves commenced to turn yellow and plants wilting; eventually they all died. The same thing happens with them every year. I was blaming the climate for the trouble, but now I am convinced that the climate is not to be blamed altogether, but worms in the ground, which attack the tender plants, are contributing toward failure.

With vegetables I had but a partial success, on account of lateness of planting; however, I dug up and gathered 23 sacks of pretty fair potatoes.

Flowers commenced to bloom about six weeks ago and are blooming still.

The apple trees you sent me in the spring are doing nicely; also one apple (Tetofsky) and three seedlings from last year's planting.

With few exceptions the currant bushes started to grow, but none of the raspberries took root. However, there are three raspberry bushes from last year's planting, and one had a flower but failed to mature into fruit.

During the summer I noticed that my apple trees lost their vigor and did not grow as they should. Upon inspection I found yellow spots on the leaves, caused by a small green jumping insect, hardly visible to the eye. Not knowing any other remedy for such unwelcome guests, I just sharply tapped with my finger upon the branches, shaking them off very easily from under the leaves, doing so whenever opportunity allowed. The growth improved and they are now vigorous with green leaves.

It would be of great benefit to Alaska if the propagation of common trees which have an economical value were started, say the pine.

George Roll, Hope City (Cook Inlet), June 8.—It gives me great gratification to inform you that the fruit trees, raspberry and currant bushes sent by you in the spring of 1905 made a fairly good growth. The raspberry and currants did very well. The fruit trees have maintained themselves well during the winter, without any protection whatever. The past winter has been the coldest winter we have had for ten years. The trees were covered well with snow all winter, which is not the case every winter. The mice did a great deal of damage by gnawing the bark from the fruit trees. Next winter I intend to prevent this feast by tying tarred paper around the trees.

George Roll, Hope City (Cook Inlet), October 1.—I herewith transmit the following report:

Apple trees: Martha, doing well; new growth during the season 26 inches. Duchess, doing extra well; very dark-green leaves; growth only 20 inches. Yellow Siberian crab, good healthy leaves; making only 14 inches growth.

Raspberries: Thrifty looking; new growth for the season 54 inches. Leaves all green and have ripe and green berries at this date; first berries ripened about August 10. Size of berries 2§ inches long. Plants two summers old.

Currants: Bushes look vigorous; have grown 30 inches during the season; two summers old; no fruit. Native do not do well in the gardens; in blossom too early and nearly all blossoms get killed by early spring frosts. Four-year-old bushes larger than the native and about two weeks later than the native. One 4-year-old bush yielded 16 pounds of fruit.

Gooseberries: Four to five years old; new growth 5 to 10 inches. Five bushes gave 12 quarts of fruit. Leaves coloring at this date. New growth gets winterkilled from 4 to 5 inches. Fruit commenced ripening about September 15.

Strawberries: Native (Alaska) fruit ripening about August 20. New plants from 4 to 6 feet long.

Vegetables: A fairly good season, although very little sunshine from June 25 until September 11, with very little rain. Frost came about September 1.

Beans: Early Challenge, planted May 22 and 26, gave a very small crop. Were ready, or rather had to be picked on account of the cold, frosty nights, on and after September 24. Two hundred feet yielded only 1½ quarts of half-grown pods.

Beets: Early Egyptian, planted May 22 and 26, produced roots from 3½ to 4 inches in diameter, very few going to seed.

Cabbage: Early York, transplanted May 28 till June 10. About 200 plants were set out, but the first week in July the maggots began feeding on the roots and killed about 50 per cent of them. The balance produced heads from 2 to 6 pounds. Good for table use about September 20.

Cauliflower: Early Snowball, most all killed by maggots; few produced small heads.

Celery: White Plume, transplanted July 6, and October 1, 12 to 16 inches high, growing yet and nearly all blanched.

Carrots: Ox Heart, planted May 22 and 26; October 1, very large roots.

Potatoes: Early Ohio, Early Freeman, Early Rose, Colorado. Early Rose are little better than Freeman. Early Ohio is not as heavy a yielder as the Early Rose or Freeman, but has good-sized oblong potatoes and small tops. Colorado did not yield very much. Planted May 18 to June 4. Total yield, 1,735 pounds. I had a very good crop, although the yield of 1905 was about 100 per cent better.

Ruta-baga: Purple Top, transplanted May 28. Weight from 5 to 12 pounds each. Sown from seed June 16, weight from 2 to 4 pounds each.

Turnips: Purple Top, sown May 22. Seed bought in Seattle did not germinate, as without doubt the seed was very old. Sown again, my own home-grown seed, 4 years old. Did germinate very good. A 100-foot drill produced about 195 pounds good-sized turnips, although most all of them were maggot eaten.

Parsnips, sown May 20 to 26, yielded roots of fairly good size.

H. S. Tibbey, Coal Harbor, Unga Island, July 1.—Referring to the grafts and seedlings sent last spring, I take pleasure in reporting that they were planted in the open in a spot somewhat sheltered from the cold northwest winds. With but few exceptions they throve well during the summer and fall. Of the seedlings but one survived the winter; of the apple grafts four came through the inclement winter in good shape and are strong and sturdy.

The red currants (2) and raspberries did best of all and have already made 8, 12, and 14 inches of growth so far this spring, and indications point at least to flowers, if not berries, during the summer.

The experiments made in cultivating the wild strawberry have met with entire success. To-day they compare favorably with the cultivated domestic berry.

John W. Dobbins, Nushagak, March 1.—Your letter of September 20, 1905, reached me this morning 60 miles from Nushagak, five months and ten days on the way from Sitka. No wonder experimenting in agriculture is slow. Again, as to Nome, after four years of hard work and expense in preparing garden land, houses, and plant beds, and fencing, I could scarcely get a recognition from anyone. Not being satisfied with such results, I gave a lease of my possessions on patented land to another party to still continue the experiments at Nome until I could find a suitable location in which I might be able to advance. I went to Seattle, and from there to Nushagak. I arrived at Nushagak May 30, 1905, rather late in the season to prepare and plant many varieties of anything except common garden truck. I brought with me from Seattle 1,000 strawberry plants. I planted them about June 15, and, wonderful to relate, they made a good growth, both in stem and root; the runners bore fine young, healthy plants for this year's planting. The original plants did not bear fruit. I am located 30 miles from Nushagak, northwest up Wood River. The most of my seed

potatoes, two bags of Early Rose and two bags of Burbank, did well, especially the Early Rose.

Flat Dutch cabbage made excellent growth for late planting, but did not head. Early York did better. Flat Strap Leaf turnip grew to good size.

Many varieties of radishes and lettuce grew rapidly and will be profitable for table use. Onion sets made fine onions. (A bear on Sunday night destroyed a bed 10 feet square.) Onion seeds did not thrive. Peas were not a success. Carrots and parsnips did well. This is the extent of vegetable gardening this year. The land is good, but requires cultivating. I have a fine piece of land prepared for this year's planting.

I brought from Seattle twelve varieties of rose bushes; all are doing well, and a dozen other pot plants are all thriving.

Rev. J. H. Schoechert, Quinhagak, Kuskokwim River, January 24.—The seeds you kindly sent last year and the offer of free distribution of raspberry plants were received in due time, for all of which we desire to thank you most sincerely. Being so near to Bering Sea, where no trees grow, we fear it would be useless and unnecessary expense to make the attempt with raspberry plants and fruit trees.

Turnips, radishes, lettuce, and cress were those we had the most success with the past summer. Radish (French Breakfast), Curled parsley, Curled cress, and Improved White celery were sown from April 1 to 15 in the hothouse and did well, but those which were sown in the middle and latter part of May in the garden did poorly, the summer being too cool and wet.

Early Jersey Wakefield cabbage and cauliflower, which were first sown in boxes the latter part of March and later transplanted in tin cans, one plant in a can, and at the beginning of June placed in the garden, did fairly well.

Onions we tried the past few years, but have had poor success so far, even in the hothouse. We must also report the same of carrots, beets, peas, and mustard, but then, as mentioned before, the season was wet and cold; besides, along the coast here it seldom gets very warm.

With the flowers Mrs. Schoechert had better results. She sowed them in March and transplanted them in the hothouse in May. Stocks were very nice and fragrant. Dwarf nasturtium, sweet peas, mignonette, pansy, and phlox drummondii were real beauties and the delight of everyone. They were kept in the house and the hothouse.

Rev. Peter Orloff, St. Michael, March 5.—I have the honor to report the following as to my progress in garden products at St. Michael, Alaska, for the year 1905, from seeds received from your Department:

Planted a garden of 300 square feet with the following vegetables: Lettuce, turnips, ruta-bagas, beets, parsley, and potatoes, with the following results: Lettuce, ruta-bagas, and turnips produced good crops; beets and potatoes were small; parsley and cauliflower did not grow.

I desire to make larger experiments in the garden products this year and give it further attention, and in order to aid in my enterprise I would respectfully ask that you send me at once a small supply of seeds suitable for this part of Alaska.

S. A. Shea, Council City, October 15.—Yours of October 2 at hand, and will here state what I grew at Council:

Early Milan Purple Top turnip; Early Globe Purple Top turnip; Golden Heart ruta-baga; Wakefield cabbage and Succession cabbage, which are ten days later than Early Wakefield; Radishes of all kinds except Chinese Giant. Beets, peas, parsnips, and carrots do well. Kale grows extra fine; spinach not so well. For manure I made compost, using stable manure, burnt earth, and fish. To make cabbage head and turn white is a secret of my own, and I do not care to

let every one know it, as it would injure me. I had better lettuce than I ever saw in the States. The suitable kinds are New York Head, Immensity, and Golden Queen. The above are the best for Council.

Potatoes will prove profitable at Council, as I have tried them the best and worst of seasons, and when they get killed by frost I find them large enough for market. I had real large ones this season, but only a few hills to try.

The island I own contains 60 acres of good soil. The water runs under the island all winter. Therefore there is no ice in the ground after June 1. There is no other place near Council fit for gardening. It would be a fine place for an experiment station. Oats will grow finely; so will wheat. Oats are ready to cut for hay by July 25. I could raise tons of vegetables there, but I could not sell them.

Rev. John W. Chapman, Anvik, October 6.—The season has been an unusually favorable one for our gardens. Potatoes are large and of fine quality. Cabbages formed fine, solid heads. Cauliflowers were better than usual. The Early Paris grew to a diameter of over a foot, but they were not so compact nor so sure as the Snowball. Egyptian beets grew to a diameter of 4 inches, and were all tender and good, few of them running to seed. The soil upon which they were grown had a good deal of lime and ashes. A head of Wakefield cabbage without the roots and large leaves weighed 6 pounds. The largest potatoes weighed 20 and 21 ounces. The potato crop was greatly benefited by the use of stable manure. A piece of ground 20 by 50 feet produced over 1,000 pounds of turnips. Mr. T. Spalding raised 2,100 pounds of potatoes on a piece of ground 50 by 70 feet. He also showed me some wheat which had reached maturity. Windsor beans attained a fair size. Valentine beans made pods of from 4 to 5½ inches in length. This is the first time that we ever saw them so forward here. Kohl-rabi was perfectly successful. Rhubarb is excellent.

Five natives raised potatoes in quantities varying from 50 to 2,000 pounds each. I hear of two gardens made by Chageluk natives this season. Interest in gardening among the natives is increasing.

Cattle have proved a good investment. The cow gave us 2,000 quarts of milk the first season, paying for her purchase and transportation and that of her calf and her own keep for a year. She freshened September 21 and is now giving 18 quarts per day on native forage alone. The stock are all in fine condition.

George H. Miller, jr., Circle City, December 6.—I received from you in the spring of 1905 some apple trees, also some raspberry and currant bushes, which grew finely, but the raspberries and currants were winterkilled. We had a very severe winter last year (1905), the thermometer registering 72° below zero for nine days. Last winter we had 4 feet of snow on the level, but so far this year only 11 inches.

One of the apple trees which I received in the spring of 1905 I took up in the fall and kept in the house during the winter in a large wooden tub. In the spring I did not take it out of the tub, but set it out of doors, where the new wood made a growth of 18 inches. It is now over 2 feet high and in fine shape. Shall put it in the ground next spring.

Received raspberry and currant bushes last spring. They grew very finely, and one feature in the raspberries I note is that the leaves retain their fine dark green color for a month after all else is dead.

The Yukon River was very low this year when it froze, lower, in fact, than for ten years.

The following data may be of interest:

Opening of the Yukon River at Circle, Alaska.

Year.	Date.	Year.	Date.
1898	May 12	1903	May 16
1899	May 19	1904	Do.
1900	May 11	1905	Do.
1901	May 22	1906	May 14
1902	May 16		

The river closed this year November 7.

Henry A. Stade, Circle, August 27.—I take pleasure in reporting to you the growth of the seeds you forwarded to me.

Beets, Edmond Blood Turnip, did well, large and prolific; carrots, Scarlet Horn, matured in good shape; peas, Alaska, did finely, abundant yield; cabbage, Early Jersey Wakefield, poor stand, otherwise good; parsnips, Hollow Crown, slow growth, did not mature; ruta-bagas, Thoburn Improved, did well; turnips, Purple Top, did well; crab apples, five of the six trees sent doing finely; currants, only one out of the lot received lived; raspberries, very sorry to report that none of them grew.

Potatoes, Burbank, those planted on old ground did well; those on new ground did not do so well. They were small and did not mature.

Wheat, barley, and oats did well and matured by August 25.

Timothy and clover (red) did well; hard to cure, owing to frequent rains.

If you can send me a few potatoes of an early variety, I shall be very glad to try them.

Henry Butke, Chena, October 15.—I wish to make a statement or report the result of the seed that was sent to me. Brussels sprouts, cabbage, kale, carrots, and ruta-bagas all did very well; in fact, I never saw any better in the States. Parsley, onions, and celery did not do very well. I planted turnips, potatoes, and string beans of some seed that I had, and they were extra fine. In fact the only stuff that did not do well was the onions, parsley, and celery. I hope that you will send the nursery stock as early as possible, so I can get them set to get an early start.

J. F. Karshner, Tanana Hot Springs Farm, September 27.—I will drop you a short report on my crops. I have made a few trials with different plants this year, and they all made a good showing. Tobacco made a great growth. I had leaves over 3 feet long on some plants. Then corn was a success. I had roasting ears that were fine. Some of them were rather harder or more mature than was wanted. Next on the list were muskmelons. I had quite a nice lot that got ripe. Tomatoes were a grand success. The vines were loaded with the finest fruit one could wish, and part of them ripened; the balance I put under sash with glass cover, and we have now been eating ripe tomatoes from them for some weeks. I grew squash of several kinds; some of them weighed 33 pounds, and some of my cabbage weighed 24 pounds. The potatoes were as fine as I ever grew and of the finest flavor, dry and mealy. In fact, all crops are above the average. I sowed the wheat I had and found an improvement that surprised me. Some plants produced as high as 32 heads to one grain. I cut it about August 20 and got 10 fine bundles. I have not thrashed yet, but expect a fine yield; have counted as high as 42 grains to the head. The second year's planting seems to show the same results as potatoes, namely, a larger and earlier crop. We have a flock of chickens—about seventy—and six fine pigs.

SOIL TEMPERATURES.

A record of soil temperatures taken at Sitka and Kenai experiment stations is submitted herewith. A 6-inch thermometer is planted so that the bulb will record the temperature 6 inches below the surface. A 24-inch thermometer in like manner records the temperature of 2 feet below the surface. At Sitka there is in addition a minimum thermometer placed 6 inches above the surface, in order to record the actual temperature at the surface of the ground.

Soil temperatures.

SITKA EXPERIMENT STATION.

Date.	Temperature.			Date.	Temperature.			Date.	Temperature.		
	At 6 inches below surface.	At 24 inches below surface.	Minimum at 6 inches above surface.		At 6 inches below surface.	At 24 inches below surface.	Minimum at 6 inches above surface.		At 6 inches below surface.	At 24 inches below surface.	Minimum at 6 inches above surface.
1906.	°F.	°F.	°F.	1906.	°F.	°F.	°F.	1906.	°F.	°F.	°F.
May 20	49	44.5	35	July 9	54.5	51	40	Aug. 27	56	53	48
May 21	48	45	42	July 10	56	51	49	Aug. 28	56	53	48
May 22	47	45	30	July 11	55	51	44	Aug. 29	56	53	40
May 23	48.5	45	36	July 12	56.5	51.5	51	Aug. 30	56	53	44
May 24	48	45	35	July 13	56	51.5	54	Aug. 31	56	53	47
May 25	49	45.5	37	July 14	56	51.5	51	Sept. 1	56	53	47
May 26	52.5	45.5	50	July 15	55.5	51.5	45	Sept. 2	56	53	43
May 27	53	46	40	July 16	53	52	51	Sept. 3	54	53	44
May 28	52.5	46	46	July 17	53	52	45	Sept. 4	54	53	44
May 29	52.5	46.5	45	July 18	53	52.5	45	Sept. 5	52	53	42
May 30	51	46.5	43	July 19	53	52.5	44	Sept. 6	52	53	44
May 31	51	47	46	July 20	53.5	52.5	45	Sept. 7	52	53	44
June 1	50	48	47	July 21	53.5	52.5	48	Sept. 8	52	53	44
June 2	50	48	50	July 22	53.5	52.5	51	Sept. 9	52	52.5	42
June 3	50	48	55	July 23	53	52	51	Sept. 10	52	52.5	36
June 4	50	48	48	July 24	53	52	51	Sept. 11	52	52	44
June 5	51.5	47.5	45	July 25	53	52	51	Sept. 12	52	52	40
June 6	51.5	47.5	45	July 26	53.5	52.5	49	Sept. 13	52	52	41
June 7	52	47.5	44	July 27	55.5	53	44	Sept. 14	52	52	44
June 8	52	47.5	39	July 28	55.5	53	43	Sept. 15	52	52	44
June 9	52	48	38	July 29	55	53	43	Sept. 16	52	52	41
June 10	52	48	43	July 30	55	53	45	Sept. 17	51	52	32
June 11	52	48	39	July 31	55	53	48	Sept. 18	51	52	31
June 12	52	48	42	Aug. 1	55.5	53	40	Sept. 19	50	51.5	29
June 13	52	48.5	40	Aug. 2	56	53	40	Sept. 20	50	51.5	28
June 14	52	48.5	44	Aug. 3	56	53	49	Sept. 21	48	51.5	27
June 15	52	48.5	35	Aug. 4	56	53	50	Sept. 22	48	51	36
June 16	52.5	48.5	36	Aug. 5	55.5	53	52	Sept. 23	48	50.5	45
June 17	52.5	49	42	Aug. 6	55.5	53	51	Sept. 24	48	50.5	42
June 18	53.5	49	43	Aug. 7	55.5	53	48	Sept. 25	48	50.5	39
June 19	53.5	49	42	Aug. 8	55.5	53	46	Sept. 26	48	50	37
June 20	53	49	34	Aug. 9	55.5	53	50	Sept. 27	48	49.5	40
June 21	53	49	36	Aug. 10	55.5	53	48	Sept. 28	48.5	48	37
June 22	53	49	38	Aug. 11	55.5	53	46	Sept. 29	47	48	45
June 23	53	49.5	43	Aug. 12	55.5	53	48	Sept. 30	49	49.5	44
June 24	52	49.5	40	Aug. 13	55.5	53	44	Oct. 1	49	49.5	32
June 25	51	49.5	42	Aug. 14	55	53	44	Oct. 2	48	49.5	37
June 26	51	49.5	42	Aug. 15	55	53	44	Oct. 3	48	49.5	39
June 27	51.5	49.5	35	Aug. 16	55	53	44	Oct. 4	47.5	49	37
June 28	53	49.5	45	Aug. 17	55.5	53	45	Oct. 5	47	49	35
June 29	53	49.5	43	Aug. 18	55.5	53	44	Oct. 6	47	49	34
July 1	53.5	50	49	Aug. 19	56	53	31	Oct. 7	47	49	39
July 2	54.5	50	46	Aug. 20	56	53	46	Oct. 8	47	49	40
July 3	55	50	39	Aug. 21	56	53	48	Oct. 9	47.5	49.5	44
July 4	54	50.5	37	Aug. 22	56	53	44	Oct. 10	48	49.5	43
July 5	54.5	50.5	35	Aug. 23	56	53	41	Oct. 11	48	49.5	42
July 6	55	50.5	38	Aug. 24	56	53	44	Oct. 12	48	49.5	40
July 7	55	50.5	37	Aug. 25	56	53	46				
July 8	55	50.5	37	Aug. 26	56	53	48				

Soil temperatures—Continued.

KENAI EXPERIMENT STATION.

Date.	Temperature.		Date.	Temperature.		Date.	Temperature.	
	6-inch thermometer.	24-inch thermometer.		6-inch thermometer.	24-inch thermometer.		6-inch thermometer.	24-inch thermometer.
1906.	°F.	°F.	1906.	°F.	°F.	1906.	°F.	°F.
May 17	40	.....	July 2	52.5	42.5	Aug. 17	56	48.5
May 18	40	.....	July 3	54	42.5	Aug. 18	56.5	48.5
May 19	41	.....	July 4	53	42.5	Aug. 19	53	48.5
May 20	41	.....	July 5	52	42.5	Aug. 20	54	49
May 21	41	.....	July 6	50.5	42.5	Aug. 21	53.5	49
May 22	43.5	.....	July 7	53	43	Aug. 22	53	49
May 23	43	.....	July 8	55.5	43	Aug. 23	54	48.5
May 24	42.5	.....	July 9	56.5	43	Aug. 24	52.5	48.5
May 25	46	.....	July 10	56	43	Aug. 25	53	48.5
May 26	46	.....	July 11	54	43.5	Aug. 26	55	48.5
May 27	48.5	.....	July 12	53	44	Aug. 27	55	48.5
May 28	44.5	.....	July 13	52	44	Aug. 28	53	48.5
May 29	46.5	.....	July 14	53	44	Aug. 29	51.5	48.5
May 30	45.5	.....	July 15	52.5	44	Aug. 30	52.5	48.5
May 31	45.5	.....	July 16	52.5	44	Aug. 31	50.5	48.5
June 1	43.5	32.5	July 17	51.5	44	Sept. 1	49.5	48
June 2	45	32.5	July 18	55	44.5	Sept. 2	51.5	48
June 3	46	32.5	July 19	54.5	45	Sept. 3	51	48
June 4	46	33	July 20	54.5	45.5	Sept. 4	51	48
June 5	46	33.5	July 21	56	45.5	Sept. 5	50.5	48
June 6	47	34	July 22	56	45.5	Sept. 6	51	47.5
June 7	43.5	34.5	July 23	54.5	46	Sept. 7	51	47.5
June 8	46	35	July 24	54	46.5	Sept. 8	51.5	47.5
June 9	52.5	35.5	July 25	54.5	46.5	Sept. 9	50.5	47.5
June 10	52.5	35.5	July 26	55.5	46.5	Sept. 10	49.5	47.5
June 11	52.5	36.5	July 27	56.5	47	Sept. 11	48.5	47.5
June 12	51	36.5	July 28	55	47	Sept. 12	49.5	47
June 13	48.5	36.5	July 29	55	47	Sept. 13	48	47
June 14	47	38	July 30	54	47	Sept. 14	49.5	47
June 15	49.5	38	July 31	54.5	47	Sept. 15	49.5	47
June 16	51	38.5	Aug. 1	54.5	47.5	Sept. 16	49	47
June 17	51.5	38.5	Aug. 2	53.5	47.5	Sept. 17	48.5	47
June 18	52	39	Aug. 3	53	47.5	Sept. 18	47.5	46.5
June 19	49	39	Aug. 4	52	47.5	Sept. 19	47	46.5
June 20	48	39.5	Aug. 5	52	47.5	Sept. 20	48.5	46.5
June 21	52	39.5	Aug. 6	52	47.5	Sept. 21	47.5	46
June 22	51.5	39.5	Aug. 7	54	47.5	Sept. 22	46	46
June 23	51	40	Aug. 8	53.5	47.5	Sept. 23	45	46
June 24	52.5	40	Aug. 9	51	47.5	Sept. 24	44	45
June 25	52.5	40.5	Aug. 10	51.5	47.5	Sept. 25	43.5	45
June 26	51.5	40.5	Aug. 11	54	47.5	Sept. 26	43	45
June 27	54	41	Aug. 12	54.5	47.5	Sept. 27	42	44.5
June 28	55	41	Aug. 13	55	47.5	Sept. 28	42	44
June 29	57	41.5	Aug. 14	56	47.5	Sept. 29	42.5	43.5
June 30	55	42	Aug. 15	57	48	Sept. 30	42	43
July 1	54.5	52.5	Aug. 16	56	48			

METEOROLOGICAL OBSERVATIONS.

The following data are condensed from the monthly reports of the stations named. It would be impracticable to publish the full data on account of their bulk, but the essential facts are given in the record submitted herewith. The first column shows the highest and the second column the lowest temperature reached during the month. The third column shows the daily mean for the month; that is to say, it is the average temperature of both the highest and lowest daily readings throughout the month. The fourth column gives the amount of rainfall in inches each month, and in the succeeding four columns it is attempted to give an idea of the character of the weather, by

giving the number of clear, partly cloudy, cloudy, and rainy days for the month. A careful study of these data will convey a fairly accurate idea of the climatic conditions at any one of the stations named. The military stations ceased to send reports to the writer in the middle of the summer and hence the data are not complete for those stations.

Meteorological observations.

SITKA. R. W. De Armond, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1905.	°F.	°F.	°F.	*Inches.*				
October	57	28	45.74	7.03	8	5	18	17
November	60	19	41.93	11.37	3	9	18	21
December	49	23	38.03	11.21	2	4	25	21
1906.								
January	48	− 2	26.10	7.25	11	1	19	12
February	50	22	37.28	1.89	16	3	9	6
March	55	21	39.03	1.58	17	3	11	6
April	59	31	41.93	10.63	3	10	17	25
May	75	31	47.82	3.46	7	11	13	15
June	65	34	55.39	3.34	9	10	11	16
July	69	40	54.91	7.45	11	1	19	15
August	65	43	54.79	4.66	9	3	19	16
September	66	33	52.35	5.78	6	4	20	20
October	65	34	46.57	15.22	1	6	24	25
November	51	25	39.7	15.59	5	9	16	22

KENAI. P. H. Ross, observer.

1905.								
October	54	12	38.07	2.92	8	6	17	16
November	45	4	32.21	2.16	8	2	20	17
December	40	−24	16.75	.45	9	3	19	9
1906.								
January	33	−42	− 3.98	.25	19	5	7	4
February	38	−15	20.72	.10	14	5	9	1
March	48	1	26.48	.95	20	2	9	4
April	61	− 5	35.62	.08	15	11	4	3
May	79	22	44.83	.29	18	4	9	3
June	75	32	52.25	.57	15	2	13	7
July	70	34	52.93	4.41	7	6	18	17
August	72	31	53.72	2.95	4	13	14	16
September	70	21	47.84	1.41	12	6	12	10
October	53	10	38.1	1.74	9	2	20	8

COPPER CENTER. J. W. Neal, observer.

1905.								
October	49	− 3	27.70	.97	9	8	14	8
November	48	−10	25.13	.94	6	11	13	7
December	32	−33	− 1.95	.97	4	7	20	12
1906.								
January	32	−74	−24.43	1.14	18	4	9	7
February	24	−31	− 5.26	.19	14	4	10	3
March	39	−15	15.30	.85	12	.....	19	5
April	59	−17	28.76	.36	5	13	12	4
May	77	20	3.57	.43	10	10	11	6
June	81	26	53.23	1.59	8	5	17	10
July	81	32	52.64	2.14	4	15	12	10
August	69	26	52.46	.69	15	5	11	5
September	63	14	42.55	.39	10	7	13	6

Meteorological observations—Continued.

RAMPART. Fred E. Rader, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1905.	°F.	°F.	°F.	*Inches.*				
October	49	− 8	19.56	1.20	8	6	17	10
November	37	−29	6.87	1.43	3	3	24	10
December	13	−56	−16.90	.34	14	3	14	3
1906.								
January	5	−66	−36.84	.63	16	1	14	7
February	19	−40	− 5.16	.08	12	6	10	4
March	51	−31	14.66	.17	6	11	14	5
April	65	−21	21.10	.04	17	9	4	1
May	79	18	46.93	.40	14	9	8	4
June	84	33	62.24	.15	11	13	6	3
July	83	34	59.10	1.86	6	9	16	10
August	82	25	55.35	2.40	6	9	16	9

FORTMAN SALMON HATCHERY. Fred Patching, observer.

1905.								
November	53	10	39.51	35.93	4	4	22	24
December	44	15	34.41	24.71	.....	4	27	25
1906.								
January	47	−12	25.00	21.70	3	6	22	24
February	53	16	33.75	6.08	10	4	14	12
March	59	16	38.24	9.64	18	1	12	13
April	59	26	41.93	25.06	1	6	23	29
May	77	28	50.78	7.93	5	15	11	19
June	69	36	53.16	10.09	1	18	11	29
July	82	40	57.05	4.99	11	8	12	16
August	78	41	56.00	15.21	6	6	19	22
September	61	34	47.65	18.63	2	8	20	24
October	57	31	43.36	20.49	.....	6	25	29

KILLISNOO. Joseph Zuboff, observer.

1905.								
November	60	17	39.33	8.40	6	1	23	19
December	46	19	36.09	7.75	.....	3	28	25
1906.								
January	45	− 7	21.43	6.90	7	4	20	20
February	45	16	31.74	2.70	13	3	12	10
March	49	21	36.93	.90	16	5	10	6
April	55	28	40.71	5.15	1	7	22	17
May	70	32	48.09	1.25	13	10	8	6
June	67	42	53.45	2.85	2	17	11	10
July	68	45	54.30	3.80	8	10	13	12
August	68	45	54.19	4.90	5	6	20	13
September	60	35	47.88	4.70	1	2	27	22
October	65	33	44.89	8.40	2	15	14	15
November	51	25	36.73	9.55	3	2	25	18

JUNEAU. I. J. Sharick, observer.

1905.								
September	68	34	51.19	3.63	7	.....	23	23
November	59	7	41.58	15.44	7	.....	23	23
December	47	21	36.37	10.30	5	.....	26	27
1906.								
January	47	−10	23.14	3.60	18	.....	13	16
February	45	19	35.10	2.65	19	.....	9	9
March	59	22	42.54	.92	23	.....	8	7
April	56	29	44.83	3.03	1	23	6	29
May	80	35	54.82	3.93	13	.....	18	18
June	81	39	60.78	7.57	8	.....	22	21
July	77	58	57.73	3.98	7	7	17	17
August	72	39	55.20	6.63	17	.....	14	24
October	68	38	48.23	12.75	4	.....	27	27

Meteorological observations—Continued.

SKAGWAY. H. D. Clark, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1905.	°F.	°F.	°F.	*Inches.*				
November	56	17	36.92	4.45	5	6	19	14
December	42	9	29.95	2.21	4	1	26	11
1906.								
January	42	−21	13.86	.....	11	7	13	.....
February	38	15	28.07	1.16	16	.....	12	5
March	52	22	36.33	.57	18	7	6	4
April	56	28	41.36	3.55	2	19	9	14
May	79	36	55.15	.37	8	18	5	4
June	76	35	55.23	2.63	7	18	5	9
July	74	40	51.00	2.11	7	13	11	7
August	65	35	53.20	2.26	2	18	11	16
September	64	26	48.66	1.30	5	19	6	8
October	63	30	43.96	5.56	2	11	18	20

ORCA. W. J. Shepard, observer.

1905.								
November	50	26	37.68	29.64	3	7	20	25
December	49	15	21.33	12.64	2	7	22	26
1906.								
January	40	2	20.67	10.63	13	4	14	15
February	45	16	30.01	.94	15	3	10	5
March	59	22	37.01	5.34	14	5	12	12
April	63	23	38.34	7.54	4	8	18	16
May [a]	75	29	45.20	5.60	7	7	8	4

FORT LISCUM. First Lieut. C. J. Stedman, observer.

1905.								
November	39	21	31.85	10.32	9	5	16	19
December	39	4	24.35	7.85	13	6	12	19
1906.								
January	36	−8	12.49	12.53	19	3	9	13
February	38	7	24.00	1.83	20	5	3	6
March	44	18	31.22	7.54	18	.....	13	13
April	48	18	35.38	4.20	18	6	6	12
May	71	28	44.04	1.36	24	4	3	9
June	74	36	50.80	4.01	14	8	8	16
July	66	39	50.47	7.12	5	3	23	22
August	64	35	51.01	8.46	12	7	12	19
September	68	29	46.19	4.11	15	2	13	12

WOOD ISLAND. S. A. Coldwell, observer.

1905.								
October [b]	52	31	41.82	6.80	5	.....	20	8
November	49	28	38.09	8.00	6	.....	24	15
December	61	12	32.17	1.88	10	.....	21	8
1906.								
January	51	.....	22.65	2.50	11	.....	20	4
February	56	25	39.10	8.60	2	.....	26	17
March	46	6	35.93	3.50	15	.....	16	6
April	54	21	38.61	3.80	6	.....	24	9
May	74	32	45.60	5.10	12	.....	19	7
June [c]	.....	.....	.....	.....	.....	.....	.....	.....
July	72	42	55.40	4.70	10	.....	21	13
August [d]	71	41	53.90	9.20	1	.....	21	12
September	64	38	51.66	1.50	12	.....	18	5
October	59	31	44.51	6.70	7	.....	24	12

[a] For twenty-one days only.
[b] Twenty-five days only for October, 1905.
[c] June missing.
[d] Twenty-two days only for August, 1906.

Meteorological observations—Continued.

TYONEK. Durell Finch, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1905.	°F.	°F.	°F.	*Inches.*				
October	58	22	38.70	3.19	7	3	21	11
November	47	10	33.43	3.10	9	.....	21	10
December	41	−14	19.98	1.24	9	5	17	6
1906.								
January	35	−27	.72	.65	21	2	8	6
February	41	− 6	23.51	.47	19	1	8	2
March	49	10	29.16	1.32	19	.....	12	4
April	53	11	37.44	.77	15	3	12	5
May	74	26	31.86	.39	19	3	9	3
June	71	34	51.98	1.00	14	6	10	6
July	74	42	56.64	2.96	10	4	17	8
August	74	41	56.48	2.94	7	3	21	10
September	74	29	50.41	1.67	15	.....	15	5

SUNRISE. A. Lawson, observer.

1905.								
October	53	21	37.30	4.36	5	4	22	21
November	50	7	32.81	9.47	4	7	23	24
December	44	−14	19.97	8.45	9	4	18	12
1906.								
January	41	−29	− .82	2.18	18	3	10	12
February	51	−10	24.18	.29	17	4	7	4
March	52	8	26.96	4.13	12	3	16	14
April	54	6	34.43	1.17	6	6	18	17
May	76	25	44.99	2.35	14	7	10	17
June	76	35	52.15	2.46	9	9	12	16
July	69	36	53.15	1.84	2	8	21	19
August	68	36	52.69	3.70	2	9	20	26
September	64	27	45.74	1.54	4	12	14	11
October	54	18	38.07	6.67	2	2	27	20

COAL HARBOR. Henry S. Tibbey, observer.

1905.								
October	58	30	43.24	3.30	6	14	11	12
November	54	21	38.40	9.25	8	6	16	17
December	42	12	28.61	5.08	14	7	10	13
1906.								
January	41	1	21.97	2.33	16	4	11	8
February	43	19	35.53	5.41	4	2	22	21
March	48	.....	31.22	6.46	8	10	13	14
April	50	19	36.19	2.61	7	8	15	19
May	64	25	41.74	4.07	6	9	16	16
June	69	37	49.46	1.01	15	12	3	7
July	67	38	51.60	3.18	6	9	16	14
August	69	38	52.40	4.28	3	16	12	18
September	62	35	48.96	3.42	3	16	11	14
October	57	31	43.02	4.44	6	12	13	17

DUTCH HARBOR. F. Schroder, observer.

1905.								
October	56	28	41.67	5.00	6	.....	25	15
November	55	24	37.34	13.78	3	.....	27	15
December	44	16	30.51	3.76	3	.....	28	20
1906.								
January	46	10	26.56	.71	5	.....	26	11
February	41	15	33.93	9.46	.....	.....	28	20
March	50	7	31.36	12.19	9	.....	22	20
April	48	22	35.23	3.07	12	10	8	12
May	50	28	38.95	6.82	10	.....	21	11
June	54	37	44.05	1.14	3	1	26	4
July	61	39	48.43	3.56	2	9	20	12
August	61	37	49.08	3.10	1	11	19	10
September	61	34	48.69	2.29	1	4	25	15

Meteorological observations—Continued.

SUMMIT. G. A. L. Geraway, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1905.	°F.	°F.	°F.	*Inches.*				
August	97	35	54.90	3.73	6	13	12	19
September[a]								
October[b]								
November	38	−22	19.34	1.53	6	11	13	12
December	19	−37	.32	.46	14	14	3	3
1906.								
January	[illegible]	−49	−17.51	1.19	20	1	8	9
February	30	−25	9.61	.46	12	5	9	3
March	40	− 3	23.67	1.04	8	10	13	7
April	46	1	26.89	1.26	14	6	6	7
May	73	31	48.54	1.02	12	12	7	9
June	80	41	60.91	4.25	8	14	8	18

TEIKHILL. Joseph H. Embleton, observer.

1905.								
October	52	9	31.18	1.48	8	.....	23	8
November	45	− 6	23.16	4.90	11	3	16	12
December	37	−25	5.23	2.33	9	5	16	16
1906.								
January	36	−45	−10.06	2.50	12	4	15	12
February	27	−19	4.82	.20	16	2	10	3
March	45	−11	20.40	1.87	14	4	13	10
April	53	−10	31.41	.58	4	3	23	2
May	81	15	44.75	.25	12	.....	19	4
June	86	27	53.10	1.39	9	1	20	13

KENNETT. Oscar Sall, observer.

1905.								
August	81	.....	.....	.....	11	5	15	.....
September	69	.....	.....	.....	14	.....	15	.....
October	58	.....	.....	.....	14	.....	17	.....
November	46	.....	.....	.....	11	.....	19	.....
December	27	.....	.....	.....	10	2	19	.....
1906.								
January	33	.....	.....	.....	18	3	10	.....
February	39	.....	.....	.....	20	.....	8	.....

CHESTOCHINA. J. L. Miller, observer.

1905.								
October	46	− 2	25.83	1.68	11	14	6	7
November	45	−11	21.23	.03	3	3	19	1
December[c]	20	−30	1.04	.75	4	4	20	4
1906.								
January	25	−55	−15.86	.26	16	2	13	1
February	28	−25	− 2.78	.06	16	4	8	3
March	.....	− 3	.....	.03	20	5	6	2
April	56	15	34.66	.....	15	6	9	.....
May	76	28	47.28	.....	18	7	6	.....
June	78	36	55.23	1.62	17	5	8	3

CENTRAL. Glenn Young, observer.

1905.								
August	72	25	49.80	2.08	8	12	11	16
September[a]	.....	.....	.....	.....	.....	.....	.....	.....
October	.....	−14	.....	2.61	13	5	11	5
November	.....	−25	.....	.77	9	9	10	6
December	.....	−50	.....	.35	18	8	2	3

[a] September missing. [b] October missing. [c] 28 days for December only.

Meteorological observations—Continued.

CENTRAL. Glenn Young, observer—Continued.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	*Inches.*				
January		−60		.56	17	2	10	4
February		−37		.08	14	7	7	1
March		−15		.05	14	6	11	1
April		−15		.15	20	1	9	5
May		21		.66	15	11	5	3
June		34		4.91	11	11	8	16
July		32		4.82	11	17	3	14

TANANA CROSSING. Fred E. Stuard, observer.

1905.								
October	67	− 3	29.34	.59	6	12	13	3
November	38	−12	10.70	.60	6	17	7	2
December	16	−42	−11.94	1.00	6	20	5	1
1906.								
January	10	−69	−34.00	.01	10	7	14	1
February [a]								
March	42	−13	16.70		18	6	7	
April	66	18	42.43		17	4	9	
May [a]								
June	89	42	67.93	6.00	16	1	13	2

KETCHEMSTUCK. Edward Storbeck, observer.

1905.								
October	43	−18	16.38	.41	10	17	4	4
November	28	−35	1.85	.30	6	11	13	4
December	12	−51	−17.62	.20	15	2	14	2
1906.								
January [b]	20	−50	−27.35	.36	10		8	3
February	12	−46	−11.75		15	1	12	
March	40	−27	8.79	.06	14	7	10	1
April	54	−25	22.88	.27	15	2	13	3
May	76	11	43.41	1.69	13	10	8	6
June	83	29	54.00	1.61	18	1	11	8

NORTH FORK. Harry E. Simmons, observer.

1905.								
August	84	25	53.35	1.91	7	9	15	8
September	68	15	38.81	1.96	9	5	16	6
October	44	−17	20.92	.90	11	2	18	6
November	50	−17	14.72	.14	6		24	5
December	17	−50	−14.73	.02	14		17	2
1906.								
January	16	−67	−26.73	.70	20		11	3
February [c]		−49		.50	16	3	9	3
March		−23		.01	20	2	9	1
April		−18		.80	18	3	9	2
May		28		1.98	9	9	13	9
June		36		2.74	10	12	8	10

FAIRBANKS. Archdeacon Hudson Stuck, observer.

1905.								
September	59	18	37.86	.93	8	2	20	10
October	46	− 8	23.31	4.77	8	6	17	7
November	39	−25	8.47	.11	7	11	12	5
December	33	−55	15.81	.62	1	16	14	4

[a] February and May missing.
[b] 18 days only for January.
[c] Maximum thermometer broken.

Meteorological observations—Continued.

FAIRBANKS. Archdeacon Hudson Stuck, observer—Continued.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	*Inches.*				
January	13	−65	−36.55	1.66	4	15	12	9
February	21	−38	.18	2.61	.....	22	6	4
March	46	−22	18.06	.32	2	23	6	2
April	57	−20	25.49	.05	28	1	1	2
May	81	27	49.30	.36	16	6	9	5
June	84	38	60.40	.94	16	9	5	6
July	83	40	60.30	2.82	12	12	7	17
August	77	32	55.56	1.50	14	12	5	15
September	70	13	43.93	.25	12	17	1	7

FORT GIBBON. Chas. W. H. Heideman, observer.

1905.								
September	56	15	35.89	.59	10	.....	20	4
October	42	− 2	19.38	.50	12	.....	19	4
November	36	−30	10.00	1.10	12	.....	18	4
December	16	−63	−16.00	.18	16	.....	15	1
1906.								
January	6	−71	−36.70	.65	21	.....	10	3
February	32	−41	.86	.20	17	.....	11	2
March	40	−22	16.47	.30	16	.....	15	2
April	55	−15	23.50	.....	30	.....	.....	.....
May	73	21	44.51	1.00	24	.....	7	1

FORT GIBBON. First Lieut. R. H. Pierson, observer.

1905.								
September	55	16	33.27	.89	10	.....	20	7
October	41	− 4	21.75	.95	14	3	14	7
November	33	−29	9.61	1.80	18	.....	12	7
December	12	−59	−16.48	.70	22	.....	9	5

FORT EGBERT. Herman B. Olson, Signal Corps, observer.

1905.								
October	63	47	29.54	2.96	2	13	16	5
November	42	3	17.14	.93	15	3	12	4
December	24	−23	5.75	.68	15	.....	16	1
1906.								
January [a]	.....	.....	.....	.....	.....	.....	.....	.....
February	46	−30	13.00	.14	19	4	5	1
March	51	−11	27.51	2.19	14	9	8	4
April	54	.....	24.31	.....	12	11	7	.....
May	84	28	59.12	.54	11	9	11	11
June	92	78	70.73	.51	12	9	9	8

HOLY CROSS MISSION. Brother Constantine, observer.

1905.								
October	44	5	27.83	.42	6	5	20	6
November	39	− 8	16.50	2.00	8	7	15	6
December	34	−48	− 9.53	1.35	16	6	9	4
1906.								
January	25	−52	−24.35	1.72	23	.....	8	5
February	41	−21	7.05	.78	15	.....	13	5
March	45	−19	20.32	1.26	11	2	18	9
April	54	−10	23.39	.09	21	7	2	2
May	76	14	43.96	.22	21	4	6	1
June	77	38	57.70	1.52	22	7	1	9
July	72	37	55.33	1.37	17	9	5	11
August	69	34	53.17	3.12	9	8	14	20

[a] January missing.

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1082 Issued June 15, 1908.

ALASKA AGRICULTURAL EXPERIMENT STATIONS.

C. C. GEORGESON, Special Agent in Charge.

ANNUAL REPORT

OF

ALASKA AGRICULTURAL EXPERIMENT STATIONS

FOR

1907.

UNDER THE SUPERVISION OF

OFFICE OF EXPERIMENT STATIONS,

U. S. DEPARTMENT OF AGRICULTURE.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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ALASKA AGRICULTURAL EXPERIMENT STATIONS, SITKA, KENAI, COPPER CENTER, RAMPART, FAIRBANKS, AND KODIAK.

[Under the supervision of A. C. TRUE, Director of the Office of Experiment Stations, United States Department of Agriculture.]

WALTER H. EVANS, *Chief of Division of Insular Stations, Office of Experiment Stations.*

STATION STAFF.

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LETTER OF TRANSMITTAL.

SITKA, ALASKA, *January 29, 1908.*

SIR: I have the honor to submit herewith a report on the work of the Alaska Agricultural Experiment Stations for the year 1907.

Respectfully,

C. C. GEORGESON,
Special Agent in Charge of Alaska Investigations.

Dr. A. C. TRUE,
Director, Office of Experiment Stations,
U. S. Department of Agriculture, Washington, D. C.

Publication recommended.
A. C. TRUE, *Director.*

Publication authorized.
JAMES WILSON, *Secretary of Agriculture.*

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ANNUAL REPORT OF ALASKA AGRICULTURAL EXPERIMENT STATIONS FOR 1907.

SUMMARY OF WORK.

By C. C. GEORGESON, *Special Agent in Charge.*

The work of the year has been carried on in accordance with the plans outlined in former reports. Details will be given under the work of the respective stations. In the line of new work the two projects which were planned for this year, namely, the establishment of a live-stock breeding station on Kodiak Island and the opening of a station at Fairbanks, have been accomplished. Both stations are important and will, it is hoped, in time show results of much value to Alaska.

The season was unfavorable for crops along the coast. The summer was cold and rainy, and in consequence vegetables of all kinds were only moderately successful. Nearly all correspondents in the coast region report that their success fell short of expectations. In Alaska the husbandman is dependent upon the sun to a greater extent than in any other region of the United States. When the summer is bright and full of sunshine he succeeds. When it is cloudy and rainy it means that the earth does not get its normal amount of warmth and he fails. In the interior the climatic conditions during the past season may be said to represent an average for that region. Grain crops matured both at the Rampart Station and at the Copper Center Station.

CHANGES IN STAFF.

Mr. J. W. Neal, who had been in charge of the Copper Center Experiment Station from its opening, in July, 1902, resigned January 31, 1907. The long stay in the interior with his family made a change imperative. His place was taken by Mr. Charles W. H. Heideman, who has had a wide experience in several lines of agricultural work, especially in horticulture. He began work the 1st of March, 1907. Mr. Charles W. Heideman, jr., was employed as an assistant at the Copper Valley Station. His services began April 1, 1907.

Mr. P. H. Ross, who had been in charge of the Kenai Experiment Station for three years, resigned May 1, 1907. His place was taken temporarily by Mr. Jas. W. Gray, of Missouri. Mr. Gray had been connected with the Kenai Station during 1906 and was familiar with the work.

Mr. M. D. Snodgrass, B. S., a graduate of the Kansas State Agricultural College, has been employed to take charge of the Kodiak Live Stock and Breeding Station. His services began June 8, 1907.

Mr. J. W. Gasser, B. S., also a graduate of the Kansas State Agricultural College, has been temporarily employed to take charge of the Rampart Experiment Station during the absence of the superintendent, Mr. F. E. Rader, who is absent on a furlough, after several years' continuous service in Alaska.

ESTABLISHMENT OF A LIVE-STOCK BREEDING STATION AT KODIAK.

There is an urgent need for this station. It is conceded that a large section of Alaska is eminently fitted for cattle raising, particularly the western half of the coast region, where there is an abundance of grass and the winter climate is comparatively mild.

That cattle of the right type can also be kept in the interior can not be doubted. A few cows are kept at several places, and at Holy Cross Mission, on the lower Yukon, cattle have been kept for several years, the herd now numbering thirteen head, all of which are doing well.

Owing chiefly to the great expense, few settlers can afford to import cattle, and those that are imported are not selected for hardiness and are not particularly well suited to the climate. They have been brought for the most part from Washington, Oregon, and California, where Jersey blood prevails.

One reason for the establishment of this live-stock breeding station is to introduce hardy races of cattle and sheep. By disposing of their progeny at reasonable rates for breeding purposes, the station can aid in stocking Alaska with live stock suited to the climate.

The Galloway breed was chosen as the one which, all points considered, gave the best promise of success. This breed originated in Scotland upwards of two hundred years ago, and they have been bred to rustle for themselves. They have not usually been housed in winter, but took the weather as it came. Under such conditions nature gradually provided them with a heavy coat of hair, and this peculiarity having been inbred for many generations, is now a fixed character. It has been retained by those which are bred in the United States under much milder conditions, in spite of the fact that they are housed in order that they may produce much beef. In this respect they compare favorably with the other large beef breeds. It must be

noted, however, that some of the Galloway herds in the States are losing the distinctive thick coat of hair under this treatment. It is almost certain that in Alaska the tendency to grow a heavy coat will receive a new impetus, and in the course of a few generations Alaska Galloway robes will be as serviceable as buffalo robes or bearskins or as the hide of the musk ox.

The cow needed in Alaska is a dual purpose cow, one that will produce milk as well as beef, and as a breed the Galloway is distinctively a beef animal.

The first problem to solve, then, is the development of the milking quality without losing the other valuable characters. This will be attempted by selection and breeding. To this end the animals which have been purchased as foundation stock have been selected with a view to the milking qualities either in the individual or in the family when the individual had not arrived at an age to show it in herself. A few fairly good milkers have been secured. One cow in particular could not be dried up, and the breeder sold her because her milking propensity told against her in the show ring. This cow gave milk for 11 months, being sucked by her calf until she dropped another. In the future breeding of the station herd the milking qualities should be emphasized and encouraged, and, other things being equal, the heifers which prove to be the better milkers should be retained for breeding, while all inferior milkers should be used for beef.

The first purchase of Galloways for these experiments was made in the spring of 1906 and consisted of 2 bulls and 9 females. One bull and 6 females were placed at the Kenai Experiment Station and 1 bull and 3 females, all of them two-year-olds, were sent to Wood Island near Kodiak (see report for 1906, p. 21). These have all done well. The purchase of foundation animals was completed in the spring of 1907, when 19 head were purchased, 1 bull and 18 females. The animals were purchased from three well-known herds in Illinois and Nebraska. Of the females 7 were yearlings past, 6 were two-year-olds past, and 5 were cows, among them imported Lady Douglass, No. 23478, and Fidelia, No. 24210, both of which have won fame as show cows. The cow Fidelia is a particularly fine Galloway. Her tendency as a milker is the only drawback to her as a show cow, according to the standard of Galloway breeders. Her son, a bull calf, Alexander, No. 28844, was also purchased. He is a remarkably fine individual and is sired by the famous show bull Pat Ryan of Red Cloud, No. 20038. Pat Ryan is himself out of a dam which is a good milker and he has sired four of the heifers bought in one lot. Seventeen calves have been dropped by the females purchased, and the station owns at this writing in all 50 head of pure-bred Galloways—27 females, 3 bulls, and 20 calves (3 cows having calves when bought). The imported bull, Henry of Lochside, No. 22525 (8809), heads the

herd. He was purchased in Missouri in the spring of 1906 as a three-year-old, and has been at the Kenai Station since he was brought to Alaska.

The accompanying illustration will give some idea of the appearance of the herd at their new home on Kodiak Island (Pl. I, fig. 1).

The writer selected all of these cattle, but in the 1907 purchase he acknowledges having received valuable suggestions from Mr. Charles Gray, secretary of the Galloway Breeders' Association, who very kindly volunteered to accompany the special agent on his visits to the various breeders. Being an expert judge and familiar with the history of the leading families of the breed, his suggestions were much appreciated.

The Alaska stations are also indebted to the Chief of the Bureau of Animal Industry, Dr. A. D. Melvin, who kindly dispatched a veterinarian, Dr. W. F. Lavery, to inspect the selected animals and to test them for tuberculosis before they were purchased. The great value of these services is hereby acknowledged.

The second lot of cattle were purchased in the latter part of February and the beginning of March, 1907. They were assembled at the stock yards in Kansas City, whence they were shipped to Seattle in ordinary cars. At Seattle they had to wait two weeks for transportation to the westward. Accommodation was finally secured on a steamer, which landed them in Kodiak on April 27. In spite of some rough weather and the long confinement they stood the voyage remarkably well and not a single animal suffered from accident of any kind. They also held their own in flesh and were landed in excellent health and spirits. For a couple of weeks they were fed alfalfa hay, but the grass soon began to start and they were turned to pasture. Like the importations sent to Kenai Experiment Station in the spring of 1906, they lived wholly on the native pasture and soon became rolling fat.

The breeding station is located on the reservation made by Executive order dated March 28, 1898, and consists of 160 acres adjoining the town of Kodiak. This tract is too small for the purpose, and as the whole country is unclaimed hill land belonging to the Government, some adjoining hillsides and woody dells to the extent of about 300 acres have been temporarily added.

For lack of means no station buildings have been erected. A log house located in the outskirts of the town has been rented as a stable for young calves and a storehouse for feed. A near-by house has also been rented for the superintendent.

The immediate charge of the station has been intrusted to Mr. M. D. Snodgrass, B. S., for some time past an assistant in the experiment station of Kansas. He arrived in Kodiak in July and took hold of the work energetically. He was also appointed inspector of Kenai

FIG. 1.—GALLOWAY CATTLE AT KODIAK STATION.

FIG. 2.—LOG BARN AND CATTLE PENS AT KODIAK STATION.

Station, as he could visit Kenai in much less time and at less expense than the writer could do it from Sitka. He has made two visits to Kenai Station since his arrival. At the direction of the writer he transferred 11 head of Galloway cattle (8 grown animals and 3 calves) from Kenai to Kodiak at his last visit in October. This became necessary because there was a shortage of feed at Kenai and it is impossible to send feed to that station during the winter months. The shortage was due to the natural increase in the herd without a corresponding increase in the area devoted to feed growing. The transfer is in conformance with the plan outlined in last year's report, and will ultimately result in the closing of the Kenai Station and transfer of all the cattle breeding and dairy work to Kodiak.

RECOMMENDATIONS FOR WORK AT KODIAK STATION.

The land in the immediate vicinity of the town of Kodiak, including the reservation of 160 acres, is more or less covered with spruce forest, which yields but little pasture. When the herd increases to a number deemed adequate for the experiments there will not be sufficient pasture in that region. It is believed that a reservation should be made in the grassy valley at Calsinsky Bay of about 12 square miles in extent. Calsinsky Bay is located 15 miles south of Kodiak. It can be reached either by water or by land, though the former is easier, because the overland route crosses a precipitous ridge. The tract of land referred to is covered by a luxuriant growth of grass which will furnish an abundance of feed for several hundred head of cattle the year around. No homesteaders have located there and the region is entirely uninhabited, so there will be no encroachment upon the rights of settlers

A temporary selection of pasture land at Calsinsky Bay has been made for the purpose of these experiments, and as soon as the tract can be surveyed a permanent reservation will be recommended. It is further recommended that the entire equipment, implements, dairy apparatus, etc., now at Kenai Station be transferred to Kodiak Station in the spring, and that the dairy work which was so successfully begun at Kenai be continued at Kodiak, using the best milkers among the pure-bred Galloways for dairy cows. This change is recommended in the interests of economy and efficiency. Live-stock experiments were not undertaken until Congress made a specific appropriation for the purpose two years ago, and since these experiments could best be carried out at Kodiak it was decided to locate the live-stock breeding station there. The dairy work at Kenai can profitably be combined with the work at Kodiak, and the expense of maintaining the Kenai Station can be saved. Another reason for closing the Kenai Station is that Kenai Peninsula has not developed

as was expected when the station was located there, and that therefore the transportation facilities, more especially the facilities for the shipment of live stock to and from Kenai, remain very inadequate. In fact, the station is entirely inaccessible from October to April of each year. A suitable dairy building at Kodiak, together with the necessary barn and shed room and a cottage for the superintendent of the station, are required.

With the erection of a cottage for a foreman at Calsinsky Bay and also the building of a barn and hay sheds at that place, the plan will then be to breed and feed the main body of the herd at Calsinsky Bay. The best milkers would be separated for the maintenance of a dairy at Kodiak.

As the herd increases the surplus stock could be sold to settlers in Alaska at reasonable prices, not to exceed those at which cattle can be brought into Alaska from the Puget Sound country. If these pure-bred Galloways are sold at moderate prices, so that the people can afford to buy them, the station will in a few years be self-sustaining. This policy will at the same time materially aid both in populating Alaska with a hardy breed of cattle suited to the climate and in helping the settlers to develop a live-stock industry.

It is also recommended that a small flock of sheep of the hardy breed which has been raised in Iceland for centuries be purchased and imported for this experiment station. The Black-faced Scotch sheep would probably answer the purpose well, and that breed should be introduced also, but there probably is no sheep which will do as well in Alaska as the Icelandic sheep. It is a large mutton sheep that also yields heavy clips of coarse wool.

THE ESTABLISHMENT OF FAIRBANKS STATION.

The Special Agent visited Fairbanks in July to begin work on the experiment station, for which a tract of land of approximately 1,400 acres was reserved by Executive order dated March 22, 1906. Ten acres of land were cleared and made ready for spring work. The station equipment, consisting of a full complement of the necessary implements and also the necessary seed grain, was purchased, shipped to Fairbanks, and safely landed there. These articles were received and placed in storage. Through the courtesy of the U. S. Geological Survey four horses were secured for the use of this station, selected from the pack horses used by the Geological Survey party which operated in the Fairbanks region last summer. At the close of the season their horses were to be condemned and sold, but the best four were transferred to the Department of Agriculture for use at the Fairbanks Experiment Station. Arrangements were made with the stage company which operates between Fairbanks and Valdez during

the winter to work the horses for their feed, the stage company giving proper bonds for their return in good condition or to replace them with equally good horses in case of loss or injury.

While at Fairbanks bids were obtained for lumber for the necessary buildings to be erected next season. A small frame building was purchased and moved to the station, where it will afford shelter to the superintendent immediately upon his arrival and until other buildings can be erected, after which it can be used for other purposes.

As superintendent for the station, Mr. J. W. Neal, who had charge of the Copper Center Experiment Station for four years, and whose work at that station reflected conspicuous credit both on himself and on the Government, has been engaged. Mr. Neal severed his connection with the station last winter and left Alaska but, being interested in the work, he has consented to undertake the pioneer work connected with the development of the Fairbanks Station. It is planned that he shall arrive at Fairbanks by the middle of March and begin work. Unfortunately, the means at our disposal for work at this station are so limited that he will not be able to employ as much labor as is needed during the remainder of the present fiscal year.

PLANS FOR WORK AT FAIRBANKS STATION.

After careful investigation of conditions in the Tanana Valley the Special Agent ventures the opinion that, with proper management, both grain growing and stock raising can be carried on successfully in that valley. It is therefore planned to practice mixed farming at the Fairbanks Station with a view to demonstrate what can be done in these lines. It is proposed that as soon as the pioneer work of clearing the ground and erecting the necessary buildings has been done the the station shall, if possible, become self-supporting and thereby serve as an object lesson of the possibilities of farming in Alaska.

Special attention will be given to crops for which there is a market in the immediate neighborhood. As soon as a sufficient area has been cleared for the production of feed for a small herd of cattle, some of our milking Galloways will be transferred from the Kodiak Station to Fairbanks, with a view to test them in that climate, and if it shall be found practicable, a dairy will be operated in connection with the station. This can not be done for at least two years, unless Congress shall see fit to hasten this step by an increase in the appropriation for the clearing of land. When the cattle are introduced the breeding experiments now outlined for Kodiak Station should also be conducted here.

It is desired to introduce chicken raising at this station on a fairly large scale at an early date. This means the building of suitable houses which must be heated in winter in order to keep the chickens

from freezing. If the experiment proves successful the sales of fresh eggs, which now range from $2 to $5 per dozen, should materially increase receipts, and thus aid in further development work. While the practical side will thus be emphasized, the experimental side of the work will also receive due consideration. The grain experiments which have been inaugurated at Rampart and at the Copper Center Experiment Station will also be undertaken at Fairbanks Station. Particular attention will be given to the development of early maturing varieties of wheat, barley, oats, and rye and for the growing of seed grain for Alaska consumption. There is on the station a low lying tract of land surrounding a lake of about 25 acres in extent. This tract will afford excellent soil for the testing of grasses and forage plants of all kinds, and experiments along this line will be undertaken as soon as funds are available to hire the labor to prepare the ground.

The immediate needs of the station are a dwelling for the superintendent and a barn and outhouses for the shelter of the animals, implements, and crops. Seventy-five or one hundred acres should be cleared as soon as possible, and eventually the cleared area should be extended to several hundred acres. In order to make a practical test whether or not mixed farming can be made a success, operations should be carried out on a fairly large scale.

PROGRESS IN THE FAIRBANKS REGION.

There has been a steady progress in the growth of the farming industry in and about Fairbanks during the last two years. There are hundreds of private gardens which as a rule are in a flourishing condition, and there are a number of market gardeners and ranchers who grow produce to meet the demands of the town and the miners on the creeks. These market gardeners are all doing well. They raise potatoes, cabbage, cauliflower, lettuce, radishes, turnips, carrots, peas, and everything else for which there is a market. Home-grown potatoes retailed at Fairbanks last August for 20 cents per pound and potatoes shipped in from the Puget Sound country brought the same price. Potatoes yield abundantly in the rich sandy soil and the quality is first class. The same is true of cauliflower and early cabbage, both of which are produced to perfection. There is no longer the slightest question as to whether or not vegetables can be raised in the Tanana Valley. With ordinary care they are an assured and conspicuous success. Magnificent celery is grown there and was on the market in August. It sold at 50 cents a plant. Celery is best grown in a specially prepared bed on which the soil has been mixed to a depth of 1½ feet with about 25 per cent of horse manure. The plants are started early in boxes in the greenhouse, and when ready

to set out are planted 4 or 5 inches apart each way. As the plants grow the bed is inclosed with boards 2 feet high. The dense growth of top almost entirely excludes the light from the stems so they are practically self-blanching, and where this is not the case the stems are blanched by filling the space between the plants with soil. The possibility of producing fine large plants without artificial heat by the middle of August speaks well for the climate. The rainfall is usually sufficient for the growth of garden vegetables. There is sometimes a period of drought in the early part of the summer when liberal watering must be resorted to. Irrigation by gravitation is not practicable except in a very few instances.

Mr. W. Weurich, of Chena, who has a large and successful market garden at that town, has constructed a water wheel by means of which he elevates water from the Tanana River for irrigating his market garden of some 7 or 8 acres. Mr. Weurich has kindly given a brief description of his method in a letter which will be found under "Reports from Seed Distribution" (p. 79). Some eight or ten of the professional market gardeners have built greenhouses for the raising of early produce. In the construction of these houses the main point has been to get the largest possible area under glass at the least possible expense. They are in nearly all cases heated by large wood stoves, from which a flue is conducted to the chimney built at one end. It requires much work and care to maintain a uniform temperature with a heating apparatus of this nature, but the Fairbanks gardeners are proving that it can be done successfully. Early crops of radishes and lettuce are raised in these houses, but the main crops are tomatoes and cucumbers, and by July the wire trellises under the glass are loaded with tomatoes, which find a ready market at $1 per pound in the early part of the season, or with cucumbers, which in the early part of the season sell as high as 50 cents apiece, or $5 per dozen. Cabbage and cauliflower bring the producer 25 cents a pound. One of the largest market gardeners in that region is Mr. J. P. Rickert. He has upwards of 20 acres in vegetables and several greenhouses. He imported some strawberry plants in the summer of 1906. They wintered successfully, and the past summer he had a monopoly of the strawberry market.

The high prices which have so far prevailed for garden produce have induced a large number of people to go into the business, and in the future it is likely that competition will be felt. Nor is it all profit. Living is costly, necessary supplies of all sorts are very high, and labor costs $5 a day with board or $7.50 a day without board.

The flower gardens of Fairbanks deserve to be mentioned (Pl. II, fig. 1). Several private homes were surrounded by most luxuriant beds of flowers. Like the vegetables, flowers seem to attain a greater size and brilliance there than in more southern climes. The sweet

peas, nasturtiums, poppies, pansies, stocks, aster, and dozens of other sorts grow to perfection. Giant specimens of sunflowers with flowers as large as dinner plates were blooming with the same luxuriance one sees them display in the cornfields of Kansas, only these were the improved sorts.

There are as yet but few cows in the Fairbanks district and milk sells at 50 cents a quart. There would seem to be a good opening for a few enterprising dairymen. Horses are numerous. They are used in the mines, on the stages and drays, for freighting and pack horses, and in the winter for lumbering and on the sled stages. Comparatively few are used exclusively for farm labor. There is a good market for horse feed, and a few ranchers have seen the opportunity and are growing oat hay on rather an extensive scale. Others have cleared tracts of level land and use the native grasses for hay. There is a diversity of opinion as to the value of the native grass for hay. Some maintain that it is good for feed and others hold that it is almost worthless. The trouble with those who hold the latter view is probably due to the fact that they do not cut the grass when it is at its best. They wait until along in late summer when the grass is going to seed, and instead of a sweet succulent hay, which it would have made if cut earlier, it is merely a bunch of dry stems, bulky enough, but lacking nutrition. This is especially the case with the most prominent grass of the interior, *Calamagrostis langsdorffi*, which sends its panicles up on tall stems to a height of 5 or 6 feet. If this grass is cut when it reaches the heading stage it makes excellent and nutritious hay.

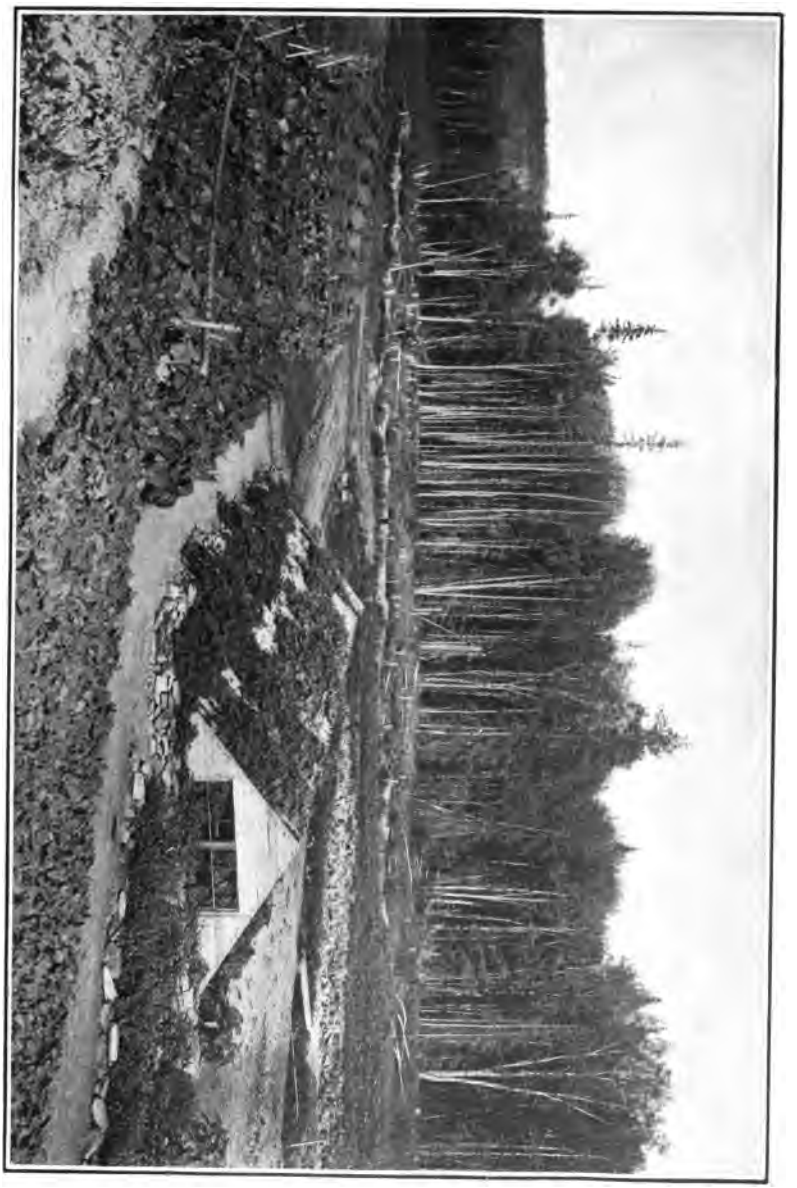
The writer would recommend the growing of oat hay whenever practicable. Properly cured it is the equal of timothy in point of nutritive value. The yield is heavy and one is always sure of a crop. If sown thickly, about 100 pounds to the acre, the stems will not be unduly thick. It should be cut soon after flowering when the grain is passing into the milk stage. Fine patches of alsike and white clover were seen in various yards and fields about Fairbanks, which prove that these clovers survive the winters under a good covering of snow.

There has been a gradual growth in agriculture nearly everywhere throughout the Tanana Valley. Those who began with small gardens have extended them. Those who found markets have undertaken to supply them. Horse feed is one of the important crops in the interior and oat hay has been found to meet the need. It is easily grown, a sure crop, and produces a fairly good yield.

At Hot Springs, Tanana, Mr. J. F. Karshner, who homesteaded the place, has associated with him Mr. Frank Manley, and together they have greatly extended the clearing; have built a hotel and baths; raised chickens on an extensive scale; grow large quantities of vegeta-

FIG. 1.—FLOWER GARDEN AT FAIRBANKS.

FIG. 2.—PULLING CARROTS, HOT SPRINGS FARM.



PORTION OF HOT SPRINGS FARM ON THE TANANA.

bles for the Fairbanks market, and raise what feed they need for their horses and cattle (Pl. III). There is at present no market for grain, hence they raise only grain for feed, but the past season arrangements were made with them to grow, for the experiment station, half an acre of Romanow spring wheat on shares. It matured perfectly. Other homesteaders have located in the same neighborhood and are gradually developing their holdings.

WINTER WHEAT MATURED.

In the fall of 1906 some wheat was accidentally scattered in a lot in the town of Fairbanks, probably from a passing wagon, as drivers would sometimes take a short cut through that lot, and the wheat was probably intended for feed. Later the lot was fenced and this accidental seeding thus protected from further disturbance. When the snow left the wheat sprang up; it grew to a height of about 3½ feet, and it had ripened by August 25. The heads were of average size and the grains were plump. With permission of the owner, Doctor Hall, some seed was gathered for use at the Rampart Station. It appeared to be a variety of Velvet Chaff. If wheat will survive the winters and mature when scattered accidentally there is no apparent reason why it should not do so when sown in proper fashion.

AGRICULTURAL DEVELOPMENT ON THE YUKON.

At Eagle the writer saw a field of about 15 acres in grain and was given samples of perfectly mature spring wheat, barley in several varieties, and Black Finnish oats. The owner, Peter Lundin, has been farming there for several years and is gradually extending the area under culture. The gardens at Eagle have been mentioned so often that it seems trite to refer to the subject; but during the summer of 1907 they were but little short of perfection.

Mr. J. F. Gay had a large garden in which potatoes were the leading crop. He grew a variety known as Irish Cobbler which he pronounced early, a good yielder, and of fine quality. His other crops were equally good. No better peas could be desired than those found in the garden of C. A. Thompson. U. G. Myers and a score of others also had excellent gardens.

At Circle Mr. N. Rassmussen had a 10-acre field of oats which he grew for his pack horses. There were also several good little gardens.

At Tanana there were not only excellent gardens, but one man had undertaken to grow potatoes on a large scale, and another had several acres of oats for hay.

At Novikaket there are successful gardens, and likewise at Nulato and at Anvik.

At Holy Cross Mission, Koserefsky P. O., there are now under cultivation between 12 and 15 acres, besides having a large natural

meadow of hay land. The mission now has upward of a dozen head of cattle reared on the place, among them some famous milkers. The mission people make their own butter and cheese and raise their own beef. They not only raise the potatoes and other vegetables needed for the large orphanage and school, but they produce a surplus which is taken by the boats on the river. The writer visited the place in 1901 when they had 4 or 5 acres in garden. The development here is but typical of the growth elsewhere.

THE FIRST SELF-BINDER AND THRESHER IMPORTED.

The year 1907 marks an epoch in northern agriculture in that it witnessed the importation of the first self-binder and the first threshing machine brought to the Yukon. They went to the Canadian side of the line, however, and not to Alaska. They were imported by Messrs. Minard and Grenier, two Frenchmen from Montreal, who farm 200 acres near the mouth of the Pelly River in latitude 62° 40′ N. Grain growing is said to be successful at that place, and these machines were imported for harvesting the large crop this year. The Pelly River empties into the Yukon at Fort Selkirk, which place has been noted for the farming of W. H. Swinehart. There is no doubt that grain can be matured here when it has been matured for seven years in succession at Rampart, three degrees farther north. But the introduction of the self-binder by practical farmers is a further evidence of the agricultural possibilities of the Northland.

An American named C. E. Carpenter and his two sons have each taken up a homestead on the Yukon a little above Fort Selkirk. Mr. Carpenter informed the writer that he was satisfied with the agricultural prospects of that region.

At Dawson the farm of Mr. W. S. Paddock was visited. He farms 100 acres besides operating a number of greenhouses for the growing of tomatoes, cucumbers, and things which can be successfully forced. Dawson prices are only 25 to 30 per cent of the prices realized at Fairbanks, but the wages for labor are also less. Mr. Paddock grows mainly vegetables and feed, and in addition to supplying dealers he also retails his produce in a store of his own in the city. Potatoes sold wholesale at 6 cents a pound and turnips at 5 cents. Oat hay sold at from $60 to $100 a ton according to supply.

AGRICULTURAL DEVELOPMENT IN THE COPPER VALLEY.

The example of the experiment station has induced quite a number of settlers to venture in the same lines. Learning that oat hay could be grown at a profit, several parties have made clearings and are now growing oat hay either for their own use or for sale. Mr. Charles W. Bram is one of these. He is located at Gakona, about 35 miles

above Copper Center, in a place where the conditions are favorable to farming. He has 25 acres under cultivation and his main crops are oat hay and potatoes, but he also raises many vegetables. It is reported that he was very successful this past season.

Mr. William Klitzke, located at Taslina, 8 miles north of Copper Center, is farming on a small scale. He is raising oat hay and vegetables. He has made arrangements to put in an irrigating plant to supply him with water during the dry season, the water being raised by means of a wheel operated by the current.

Mr. George Rorer has taken up a homestead at Dry Creek, 16 miles north of Copper Center, and is preparing to farm on a large scale. He already has several acres under cultivation and is raising oat hay and vegetables. He has built a dam on a small creek above his farm with a view to irrigating his place, which in this case can be done by the gravity system.

Mr. John McCrary, a homesteader at Copper Center, has 6 or 7 acres under culture and is gradually extending the clearing. His crops this year were oat hay and vegetables.

Mr. William J. Kale has taken up a homestead a few miles south of Copper Center and is preparing to raise oat hay.

The Indian mission and school, a Government institution, located at Copper Center, has 6 acres under cultivation which are utilized in growing feed and vegetables.

Mr. F. J. Bingham has a homestead at Willow Creek, 11 miles south of Copper Center. He has a dozen acres under culture, on which he raises vegetables and grain hay, and he will continue to extend his clearings.

All of these, it will be noticed, have begun work in the neighborhood of the experiment station. Most, if not all, of the road-house keepers between Valdez and Fairbanks make an effort to grow the vegetables required by the public who stop at their inns, and several of them also grow oat hay on a small scale. A meal for a horse in that region costs as much as a meal for a man. Hay is sold at 25 cents per pound.

At nearly all the Signal Corps telegraph stations gardens are maintained. The miners also raise gardens at their diggings, and even the prospectors who roam over the country do so when they are located for a season in any particular region.

Agricultural development has begun, and it is safe to say that it will never stop. It will go on and grow continually until the country is settled. Alaska would have been settled already with a considerable farming population if the economic conditions had not been wholly adverse to such settlement.

Without roads and without transportation facilities a vast empire like Alaska can not be settled except in the gradual way here noted.

ECONOMIC CONDITIONS A BAR TO SETTLEMENT.

The conditions which prevent the development of agriculture are economic, not agricultural.

It is self-evident that the interior of Alaska can not be settled by the class of people best suited to exploit and develop the latent agricultural capacity when it costs from $200 to $500 to move a ton of freight 100 miles inland from the port of debarkation, or more, in proportion to distance; when a seat in the stage from Valdez to Fairbanks costs $150 and meals and sleeping quarters from $5 to $10 a day in addition; when sugar, salt, oatmeal, and other equally plain articles are 25 cents a pound, bacon 40 to 60 cents a pound, condensed milk 75 cents a can, and everything else in proportion. Only people with money, or at least with an assured income, can meet these conditions. The chief assets of pioneer farmers are a vigorous constitution and indomitable courage, but these alone will not pay freight, move families, procure equipments, or buy provisions. The class of people who homestead land do not as a rule have much money, and taking into account the expenses which homesteaders in Alaska must incur, comparatively few can come here. Corporations and trading companies are not in business for philanthropic purposes; it is useless to look to them for reductions to settlers, although such a step would result to their advantage, since an increase in population would mean an increase in business. The Government alone can remedy these economic conditions and it can do it by liberal encouragement of railroad building. Alaska is a large country. It will take at least three trunk lines to open up the valleys of the Copper, the Yukon, the Sushitna, and Kuskokwim. The building of wagon roads which the Government has begun will prove of great benefit to the country. Improved transportation facilities are Alaska's greatest need. When these are provided the economic conditions which now bar settlement will gradually right themselves. Competition will bring down prices and the cost of living. Labor will be more plentiful; mines which it will not pay to work at present will be opened; resources now untouched will be exploited; business will increase; markets for farm produce will develop, and the country will be settled. Without improved transportation facilities the country will remain stagnant; only the richest mines can be worked, and the country will be deserted when these are exhausted.

WORK AT THE SITKA STATION.

PROPAGATION AND DISTRIBUTION OF NURSERY STOCK, ETC.

This work was continued during the past season. It is deemed to be one of the most important lines of work that we can undertake at this stage of the country's development.

A few trees have been growing here now for four seasons and some for five seasons. In a good fruit country some of these trees should begin to bear fruit. They have not begun to bear here, and it is not possible to say whether they will or will not bear in the near future.

APPLES.

Of the apples, Hyslop and the Yellow Transparent bloomed the past season, but bore no fruit. These two varieties are outstripping other sorts in vigor and growth. The Whitney and Peerless are also promising well, but nearly all the others mentioned in the notes on nursery stock submitted herewith are doing poorly, which would indicate that they are not adapted to the climate. The excessive rainfall and continuous mild weather prolongs the growing season until long into October. The young wood is soft and succulent, and moderately cold weather the following winter kills it. Only varieties which are adapted to a moist, cool climate can thrive in the coast region of Alaska. The climatic conditions of the interior are of course entirely different. There the rainfall is in most places too scant for normal growth, though varieties which mature their wood early may do well. The trees sent to settlers in the interior during the past couple of years are not sufficiently well established to afford evidence on which to base conclusions. Many who have planted them report that they are doing well. Many others report the trees are dead. Nearly all complain that the trees arrive too late in the season to get a good start before frost and that for this reason many died during the first winter. There is no remedy for this under present conditions. We can not afford to pay expressage on the trees and it is impossible to send packages to the interior points of Alaska by mail except during the four months when the rivers are open. River navigation does not begin until some time in June, and packages mailed from Sitka about the first of June reach their destination at interior points from the last of June to the last of July, according to transportation facilities. If the trees are not already dead when they arrive it is evident they can not make much growth that year. A few do survive and by continuing the efforts data will be eventually gathered sufficient to prove or disprove that fruit trees can be grown in the interior. One thing is certain, only the so-called summer varieties can mature in Alaska. In the interior the

season is too short and in the coast region the summers are too cool to mature fall and winter apples. Another thing which the experiments here seem to indicate is that it will be useless to try to grow standard trees. Dwarf trees which keep close to the ground are likely to succeed best. At the Sitka Station apple trees are peculiarly subject to fungus diseases. This is probably due to the moist climate. It has been necessary to spray very frequently through the summer, and even then some varieties suffer greatly.

CHERRIES AND PLUMS.

The young cherry trees did not show as much fruit the past season as they did in 1906. The tender wood was somewhat injured by the rather cold winter of 1906–7, and the trees were heaved by frost so that they all had to be reset in the spring. In addition to these unfavorable circumstances the weather was cold and wet during the blooming period, which was a sufficient cause for the nonformation of fruit. It is believed, however, that cherries will mature in the coast region in protected places. Of the four varieties growing, the Early Richmond and the English Morello are the best.

A few sample trees of a dozen varieties of plums are at the station. The trees are still small and none of them have fruited. It is too early to express an opinion as to what they may do.

BUSH FRUITS.

Currants and raspberries are propagated and distributed in large numbers. Gooseberries have not been distributed freely because they are comparatively expensive to buy and they are difficult to propagate, inasmuch as they do not grow readily from cuttings; but currants, gooseberries, and raspberries do remarkably well in Alaska not only in the coast region but also in the interior. A number of varieties of each of these bush fruits are growing at the Sitka Station. Notes on their behavior are given elsewhere in this report (pp. 37–39). There is a marked difference in the behavior of different varieties, and this is particularly true of gooseberries and raspberries. All are not equally adapted to the climate. It is therefore necessary to grow many sorts, side by side, in order to learn which will do the best. The Cuthbert raspberry has done particularly well in the coast region. Some sorts are almost failures, like the Superlative and Champlain. The Cuthbert has been cross-fertilized with the wild salmon berry (*Rubus spectabilis*) and a number of these hybrid seedlings are now growing. A few of them are large enough to fruit the coming season. These plants show great diversity in appearance. The salmon berry is a vigorous grower and produces a very large berry, which, however, is entirely devoid of both aroma and flavor, but it is an excellent

berry for culinary purposes. It is too soft to bear shipment. It is hoped that at least a few plants of the cross may inherit the good qualities of both parents.

Among gooseberries the Downing and Houghton have been fairly successful at the Sitka Station, but the Whitesmith, a large English variety, exceeds them all, native and foreign varieties. There is a wild black gooseberry indigenous to Alaska which is probably susceptible to improvement. We have secured a number of seedlings with a view of experimenting with them. Currants could not thrive better anywhere than they do in the coast region of Alaska. The red currant as well as several species of black currant are indigenous to Alaska. The wild red currant of the Kenai Peninsula is as fine and as productive a bush as the cultivated currant; racemes are long and the berries large. A number of the wild bushes have been planted at the station, but they do not grow nearly as well under culture as they do in their native jungles. Seedlings of this wild currant have been raised for future work. Several varieties of cultivated currants have been successful everywhere as far as they have been tried, both on the coast and in the interior.

STRAWBERRIES.

Last year's report has an outline of the experiments under way with strawberries, namely, the hybridizing of the cultivated varieties with the native wild species. During the last four or five years about two dozen sorts have been introduced and tested. Of these only four sorts are now alive, namely, the Magoon, Bismarck, Enhance, and Hollis. The last name has been adopted from lack of knowledge of the real one. The variety was obtained two years ago from Mrs. Helen Althouse, of Hollis, Prince of Wales Island. She did not know the name and it has not been identified with any known variety. It is a valuable sort, in that it is both hardy and productive. All of the varieties here named have been used as the mother plants in the formation of crosses with the wild Alaska berry, and there are now perhaps 2,000 plants of these crosses. None of them have borne fruit yet, but some of the older plants are expected to fruit next summer. It is a remarkable fact that, although the seed came from the cultivated varieties, the young plants nearly all resemble the wild species in leaf and in habit of growth. The object of the experiment is to develop, if possible, a variety which will be as hardy as the wild and as productive as the cultivated one. The native wild berry is of very excellent quality and it is very firm, so it would make a good shipper, but the plants are shy bearers and the berries are too small for commercial purposes although they are unusually large for wild berries. They are about the size and shape of a medium-sized thimble, although some of them attain 1¼ inches in length.

VEGETABLES.

The growing of vegetables except on a very limited scale has been discontinued. A number of varieties of potatoes are grown for the purpose of testing them further and also to produce seed potatoes for distribution. Last year the area planted was small and the amount raised was consequently also small. The season was not favorable for potatoes. The Freeman, Gold Coin, and some recently imported Norwegian potatoes promise the best. The Extra Early Ohio which did so well last year did not come up to the same standard of yield this year. It suffered much from a rot which reduced the yield.

ROOT MAGGOTS.

Turnips, ruta-bagas, radishes, and to a lesser extent cabbage, cauliflower, and all other cruciferous crops suffer from the attacks of root maggots (*Pegomya* sp.). The pest appears to be on the increase and complaints have been received from all parts of the Territory. In very many places the pest is so bad that none of these root crops can be grown. The root maggots appear to infest the soil, only new ground being exempt. When once introduced they seem sure to continue and grow more destructive each successive year. It is not practicable in Alaska to inject carbon bisulphid, kerosene, or other solutions at the roots of individual plants. Labor and material cost more than the crop is worth.

In the meantime the station has received a turnip which seems to be immune. It is a variety introduced from Sweden by the Bureau of Plant Industry, U. S. Department of Agriculture, and known as Petrowski, No. 19554. It was grown last season at the Sitka, Rampart, and Copper Center stations, and at none of them was this variety attacked, although other varieties grown alongside of it suffered badly. It is a medium-sized yellow-fleshed, firm turnip of fair quality, but not a heavy yielder. It will be tried further, and if it should continue to prove immune this is the turnip for Alaska. It is believed that its immunity is due to the fact that the leaves lie flat on the ground, close about the plant, in such a way as to possibly prevent the fly from getting at the crown to lay its eggs.

BASKET WILLOWS AND ORNAMENTALS.

The station has a small area of basket willows which are doing extremely well. They are being propagated and distributed in the hope that they may be useful both to settlers and natives. Indians are basket makers, and if they could be induced to utilize these willows and to grow them the whole community would be benefited. A few ornamental bushes are being propagated. Chief among these is

the *Rosa rugosa*, a Japanese species of the rose, which is very hardy and very ornamental. In this latitude it begins to expand its large, single, rose-colored flowers in July and continues to bloom until autumn. It forms a dense bush with a thick mass of foliage, which is of itself ornamental. It is not easily propagated; usually only a small percentage of the seeds grow, and these frequently lie in the ground a year before they germinate. The most satisfactory way of propagating it is by layering old plants, but this process is slow.

Another ornamental bush which promises to be of value to Alaska is the Tartarian honeysuckle. It is hardy and blooms freely.

Lilacs will do fairly well in protected places, but they are not at their best in Alaska, and the same is true of the Snowball. A few bushes of the Eglantine, or sweetbrier, have been grown for several years. Whenever there is zero weather, as was the case last winter, they are killed to the ground, but they sprout again in the spring. They have never shown flowers.

Of the perennial flowering plants the columbine is perhaps the most satisfactory. It is indigenous to the coast region of Alaska and all varieties seem to thrive here to perfection.

OFFICE WORK.

The amount of office work at the headquarters station is continually increasing. The correspondence with settlers throughout the Territory is large, and with the disbursing accounts, the required reports, and the work of the other stations, it is all that two persons can do. A permanent clerk and typewriter is much needed. Thus far the station has depended upon temporary assistance from persons living in town, but often for long periods at a time there is nobody to be hired.

WORK AT THE KENAI STATION.

Kenai Station has been devoted to stock breeding and dairying, as was reported last year. Except for a small garden and some grass plats, the whole of the 26 acres under culture was sown to oats for hay. The season was backward and field work could not begin until May 20. The whole summer was cold and rainy. The only period of favorable growing weather was the month of July and the first half of August. The oat crop grew slowly until July, when it began to improve, and by August 15 about half the crop was headed out. The stand was thin, due to the fact that the crop tillered but little. The crop was cut for hay between September 5 and 10 and yielded only about ¾ of a ton per acre. The rainfall was 10 inches for September, and it was therefore hard to cure the hay. The oat hay was supplemented by about 3 tons of hay from native grasses cut during the summer.

The cattle, both pure-bred Galloways and the natives, have done exceedingly well during the past year. They came through the winter of 1906–7 in fair condition and soon fattened up on pasture.

Five cows and one heifer calf, all pure-bred Galloways, were landed at Kenai May 13, 1906. These have since dropped 7 calves—3 bulls and 4 heifers—all of which have made good growth. The native cows dropped 4 calves during the past year—2 bulls and 2 heifers. The total number of cattle at the station October 1, was 22 head. As noted elsewhere, 11 of the Galloways were transferred to Kodiak Station in October, because the herd was too large for the amount of feed raised. The two horses at the Kenai Station have maintained themselves well and have kept in good flesh all through the working season without grain.

The dairy work has not been pushed as vigorously this year as last, because there was but little demand for butter, while, on the other hand, there was a demand for milk, owing to much sickness among the natives. There has been no additional clearing of land, or other improvements, because, as noted elsewhere, it is the plan to transfer the entire equipment to Kodiak Station in the spring and to temporarily close the Kenai Station.

In the garden the Early Ohio potatoes raised from seed grown at the station were the better producers this year. Gold Coin and Garfield varieties were rather inferior in yield. Lettuce, radishes, and turnips did well.

Of the several grasses timothy grew best, while orchard grass and redtop made a fair showing.

A report on the Dairy Practice at Kenai Station, by Mr. P. H. Ross, is submitted herewith (see p. 62). It is a clear statement of the methods we have followed at that station with much success, and which should be followed by everybody who keeps but a few cows. Its perusal by the owners of small dairies in Alaska is recommended.

WORK AT THE COPPER CENTER STATION.

In spite of the dry and cool weather which characterized the whole growing season in the Copper River Valley practically all the grains matured. This was due to early seeding. The ground had all been fall plowed and was ready to seed as soon as the frost went out of the surface. This made it possible to begin seeding in the latter part of April and the seeding of spring grain was completed May 6. This early seeding prolonged the growing season and nearly all of the grains had matured when the first killing frost occurred August 24.

Judging from the experience during the last five years in the Copper Valley killing frosts occur earlier in that valley than they do at Rampart, in the Yukon Valley, $3\frac{1}{2}°$ farther north. Killing frosts have oc-

curred every year in August. The earliest date has been August 14. When it holds off as late as August 24, as it did the past season, there is a chance for grain to mature if it has been seeded early, as in this instance.

There are 40 acres under cultivation at this station; of this, 29 acres were seeded to grain of all sorts, 1 acre was in garden, including five small patches, which were allowed to be used by 5 Indians in practicing gardening, and 10 acres were in grass of various sorts.

Of the 29 acres in grain about 20 acres were seeded with common oats for hay; the remaining 9 acres were divided into numerous small plats devoted to varieties.

Of the wheats the Early Riga was most promising, followed by Velvet Chaff. All of these two varieties matured and a few heads matured of the Saskatchewan Fife and Ladoga. Romanow spring wheat only matured a few heads on high ground. All the barleys matured. The most promising variety tested was the Pamir, No. 18922, the seed of which was imported by the U. S. Department of Agriculture. It came originally from a very high altitude in the Himalaya Mountains. Champion was also very promising and came next in earliness to the Pamir, while Hanna, Manshury, Sisolsk, and Chevalier come next in order named.

Of the oats tried Finnish Black has again proved itself the most desirable variety. The seed of this variety was originally imported from Finland by the United States Department of Agriculture. It is a tall, vigorous variety with black seed. Every indication is that it is par excellence the oat for Alaska. Burt Extra Early also matured. Several other varieties matured in part. They were all grown in a small way.

Of the winter grain Amber winter rye matured. Kharkov winter wheat, an imported Russian variety, was winterkilled at this station, probably because the snowfall was insufficient to protect it. Common oats sown for hay were cut August 18. Some were mature by that date and practically all would have matured in another week. As it was, they made a heavy, excellent quality of hay. The straw was short and the yield light on account of the lack of rain.

GRASSES.

The cultivated grasses, patches of which have been seeded every year since 1903, have not been a conspicuous success. Smooth brome grass (*Bromus inermis*) and wheat grass (*Agropyron tenerum*) are the only two species which have not been winterkilled. The brome grass after the first season has not been heavy enough to cut, but the wheat grass last season made a splendid yield. Both of these plats were saved for seed. Timothy has partly winterkilled and other com-

mon grasses grown at the station, such as tall meadow oat grass, velvet grass, orchard grass, and redtop have winterkilled completely, and the same is true of alfalfa, also red, white, and alsike clovers.

Realizing that the production of feed is one of the most important problems in the interior, we shall in the future attempt to cultivate native Alaskan species of grasses and forage plants. With this end in view the station superintendent, Mr. C. W. H. Heideman, has made collections of seeds of upward of 40 species of native grasses and leguminous plants. Of some only a very little seed could be secured and of others several pounds were gathered. Some of these seeds have already been put in the ground and the remainder will be sown as soon as the ground can be worked in the spring. They will be tried in plats, side by side under identical conditions, and a comparative study will be made as to their value for meadow and pasture. Such other imported grasses from northern regions as can be obtained will also be tried.

IRRIGATION NECESSARY.

The question of growing stock feed in the Copper River Valley is simply a question of water. On the uplands the vegetation is light, due to lack of moisture. In the lowlands along streams, around lakes, and in moist places the native grasses are vigorous enough to yield heavily, but these marsh grasses are unfortunately mostly sedges and do not have much value for feed. It is becoming more and more apparent that irrigation is necessary in the Copper Valley and must be resorted to to obtain anything like normal yields whether of grains or grasses. A rainfall of between 3 and 4 inches during the months of May, June, July, and August is not sufficient for the production of good crops.

DEVELOPING EARLY VARIETIES OF GRAINS.

The plan outlined in former reports for the development by the selection and propagation from the earliest maturing heads of varieties of grain which will mature in 90 days or less, if possible, has been inaugurated. The past season careful selection was made of the heads which showed the first signs of ripening in each of the many varieties grown and ripe heads were secured from all of them. Even though the main portion of a variety failed to mature there were always some heads or plants which were earlier than the average, and these were gathered and labeled to form the foundation for similar selections in succeeding years. Of each variety a selected head will be planted separately and the resulting plants from each studied in comparison with others. The selection will be continued until the all-important point of earliness is secured. In so doing

FIG. 1.—HOUSE AT RAMPART STATION, AND SOME OF THE EXPERIMENTAL PLATS.

FIG. 2.—POTATOES, RAMPART STATION.

other important qualities will constantly be kept in view, as, for instance, vigor and healthiness of the plant, productiveness, size and weight of kernels, stiffness of straw, etc. As yet the work has not proceeded far enough to report on it. The report of C. W. H. Heideman, who has had charge of the station since March 1, 1907, is submitted herewith (see p. 49).

WORK AT THE RAMPART STATION.

It is a pleasure to be able to report the gratifying success in all the farming undertakings at the Rampart Station during the past season. For some reason as yet unexplained the climatic conditions in the Yukon Valley appear to be more favorable to crop production than they are in the Copper River Valley. Killing frosts occur about two weeks later and the rainfall is nearly double what it is at Copper Center.

At Rampart the first killing frosts the past season did not occur until September 6, and the total rainfall for the months of June, July, and August was 7.31 inches. This slight difference in the length of the growing season and in the amount of rainfall is sufficient to make the difference between success and partial failure.

The special agent visited the Rampart Station in the month of August and found everything in most excellent condition. At the time of his arrival, August 6, several varieties of barley had begun to turn a rich golden yellow, while the oats, wheat, and vegetables looked very promising.

During the winter Superintendent Rader completed the station house. He built a neat little cottage of five rooms and a frost-proof cellar. It is a frame structure, built with a view to exclude the cold. The roof is corrugated galvanized iron, because this could be shipped in more cheaply than shingles. By the time spring work began the house was completed. He also built a substantial log barn and implement shed. (Pl. IV, fig. 1.)

The season at Rampart is unfortunately usually late in opening up. Plowing can seldom begin until the middle of May and sometimes later. Seeding did not begin until May 24, which is nearly a month later than the beginning of seeding at Copper Center. Again, the soil is of a clayey nature and tenacious of moisture, and it takes a longer time to get in condition for cultivation in the spring than is the case with a sandy soil.

The area under cultivation was about 7 acres, of which about 3 acres were seeded to oats to be cut for hay for winter feed for the team, and the remaining 4 acres were devoted to grains of many kinds, some potatoes, and a small patch of vegetables. Some 3 acres more are being cleared, but owing to the frequent rains it was diffi-

cult to burn the stumps and moss which cover the ground. If the season proves dry enough next June it is planned to burn over about 20 acres adjoining the present clearing, proper precautions being taken that the fire does not spread to the timber. In clearing land fire is the most economical as well as the most efficient servant that can be employed. In the summer of 1906 the station was supplied with a stump puller, which is operated by one horse and the leverage is produced by winding a wire rope about a drum. It was found to be a very efficient machine for stumps of the size found there, which range from 6 to 18 inches in diameter. There are but few of the latter size, however.

THE GRAIN CROPS.

Kharkov winter wheat matured at the Rampart Station, but on the other hand, winter rye which has matured heretofore was winterkilled, and so were so-called winter oats and winter barley. The rye was killed because the snow blew off the patch and thus exposed it to severe cold. That the oats and barley should winterkill might be expected. Nine varieties of barley matured, although none of them was seeded before May 24. The earliest of all these is the variety imported from the Himalaya Mountains, Pamir No. 18922, which was so successful at the Copper Center Station. Of all these the well known Manshury, which we have grown for several years, is one of the best.

Out of six varieties of oats the Finnish Black proved to be the best. It was practically all ripe when the killing frost occurred, September 6. A few varieties ripened only in part. This is accounted for by the late seeding.

Emmer, Einkorn, and Proso (the latter a variety of Russian millet) did not ripen, but this was to be expected.

The same plan for the development of the early maturing varieties of grain which was mentioned above has been adopted at Rampart Station and will be carried out with care.

The following grasses matured seed at the Rampart Station: Kentucky blue grass, redtop, English rye grass, meadow foxtail, timothy, smooth brome (*Bromus inermis*), and tall meadow fescue. The following were failures: Orchard grass, velvet grass, and perennial rye grass.

The most important vegetable crop in the interior is the potato, and this grew satisfactorily at the Rampart Station. Potatoes have been grown and perpetuated from home-grown seed in the Yukon Valley for a number of years. There is no longer any question as to whether potatoes can be grown there or not. The question now is to find varieties best adapted to the several regions. Owing to the difficulty and expense of shipping in seed potatoes, those which

have so far been grown there have been bought from the stores and shipped in for eating purposes. The Early Rose is perhaps the most common sort, but it is not the best potato for that country. The Rampart Station has now been supplied with seed of 35 varieties, most of them grown at Sitka, to be used in trial tests next year. It is hoped to find some among them which are adapted to the conditions. The other common vegetables did well.

NOTES ON NURSERY STOCK, VEGETABLES, ETC., AT SITKA STATION FOR 1907.

By R. W. DeArmond.

The investigations with nursery stock and vegetables have been continued along the usual lines at the Sitka Station. These include not only tests of varieties, but those that are found adapted to Alaskan conditions are being propagated for distribution. More than 12,000 fruit trees and shrubs have been sent to various parts of the Territory and reports on some of the lots are given in the letters from the station's cooperators. In determining the adaptability of some of these fruit trees and small fruits to Alaskan conditions records have been made of their condition at the beginning of the season, at different periods throughout the summer, and at the end of the annual growing season. A detailed report of them is given herewith.

APPLES.

During the winter of 1906–7 the ground heaved badly from the action of the frost. This raised the trees, injuring the root system, leaving roots much exposed. After frost had left the ground and the soil again settled it was found necessary to transplant many of the trees. This was true not only of the apples but of all the trees and plants in the open field. The new growth killed back from a third to a half by freezing.

The spring was rather late, and the trees remained in a dormant state until well toward the middle of May. Growth was slow in starting and the leaves were affected with a fungus which greatly retarded healthy growth. They were sprayed with Bordeaux mixture seven times during the season, the almost continuous rainy weather making it necessary to spray often. Growth was more rapid during the latter part of the season, but with most varieties it is too soft to withstand freezing weather. In order to check growth so that the wood might harden up, in the hope that fruit buds might form, the tips of all growing branches were pinched back in the latter part of August. Some few trees were stripped of their leaves the first of October that the wood might become seasoned before freezing.

From the standpoint of hardiness, growth, and general thriftiness the Whitney crab, Yellow Transparent, Hyslop, and Peerless stand first, with but slight difference between them.

Whitney: May 15, seventeen trees, buds well advanced. June 1, in leaf, quite vigorous. July 1, 3 inches growth. August 1, thrifty, 7 inches growth, uninjured by fungus. October 12, 15 inches growth. Nine trees stripped of leaves.

Yellow Transparent: May 15, nineteen trees, buds swelling rapidly. June 1, full leaf, all vigorous. July 1, look well, 2 inches growth. August 1, 10 inches growth, not injured by fungus. October 15, 15 inches growth, appear thrifty, new wood well hardened.

Peerless: May 15, seven trees, buds well advanced. June 1, full leaf, look well. July 1, 3 inches growth. August 1, slightly affected by fungus, 5 inches growth. October 15, 12 inches growth, in good condition.

Martha: May 15, seven trees, buds swelling. June 1, in leaf, not vigorous. June 15, sprayed with Bordeaux mixture, making little growth. July 1, badly afflicted with leaf fungus, sprayed, 3 inches growth. August 1, 5 inches growth. October 12, 10 inches growth, new wood very soft.

Lowell: Four trees, slow in starting. June 1, very backward. June 15, in leaf, not vigorous. July 1, slightly injured by fungus, no growth. October 12, three trees made 3 inches growth, wood very soft.

Red Astrachan: May 15, twelve trees, buds swelling slightly. June 1, in leaf, three trees promise thrifty growth. July 1, very backward. August 1, poor condition, badly affected by fungus. October 12, made some growth, new leaves give trees a thrifty appearance.

Tetofski: May 15, nine trees, rather backward. June 1, in leaf, look well. July 1, all look vigorous, but growth is short. August 1, 4 inches growth, somewhat injured by fungus. October 15, leaves have a thrifty look, 6 inches growth.

Eureka: May 15, fourteen trees, slow in starting. June 1, in leaf, look healthy. July 1, very little growth. August 1, 4 inches growth, considerably injured by fungus. October 15, two trees doing nicely, making 1 foot growth, others in poor condition.

Sylvan Sweet: May 15, sixteen trees, buds beginning to open. June 1, nearly full leaf, appear vigorous. July 1, 2 inches growth. August 1, 5 inches growth. October 15, 11 inches growth, thrifty appearing, wood very soft.

Brier Sweet: May 15, two trees, yet dormant. June 1, very backward. June 15, badly affected by leaf fungus. July 1, some growth, very unthrifty. August 1, in bad condition. October 15, seemingly about dead.

Pyrus baccata: May 15, thirteen trees, buds opening. June 1, full leaf. June 15, some individuals affected with leaf blight. July 1, 5 inches growth, few individuals rather backward. August 1, healthy, 15 inches growth. October 15, 2 feet growth, wood rather soft.

Transcendent: May 15, two trees, buds well advanced. June 1, full leaf. July 1, 5 inches growth. October 15, 18 inches growth, thrifty, wood soft.

Hibernal: May 15, four trees, buds opening. June 1, in leaf, healthy. June 15, one tree has cluster of bloom buds. July 1, 3 inches growth, petals falling, no fruit set. October 15, 10 inches growth, in fair condition.

Hyslop: May 15, five trees, slow in starting. June 1, leafing out, leaves rather yellow. June 15, bloom buds ready to open. July 1, 1 inch growth, petals falling, no fruit set. October 15, 4 inches growth, leaves falling naturally, wood well hardened.

Raspberry: May 15, eighteen trees, buds well advanced. June 1, in full leaf. July 1, some trees making growth, others are not, all look healthy. August 1, badly affected by fungus. October 15, 4 inches growth, looking well.

Red June: May 15, fifteen trees, well advanced. July 1, 2 inches growth. August 1, four trees badly affected by fungus, others slightly, 5 inches growth. October 15, 1 foot growth, looking very well, wood very soft.

Jenkins: June 1, four trees, leafing out. August 1, very slow growth. October 15, in poor condition.

Maiden Blush: May 15, two trees, very little advance. June 1, leafing out. July 1, very little growth. August 1, unthrifty. October 15, appears healthy, very little growth.

Early Harvest: May 15, fourteen trees, buds swelling. June 1, in leaf, thrifty. July 1, vigorous looking, but little growth. August 1, look well, growth slow. October 15, all look healthy, wood very soft.

Northwest Greening: May 15, two trees, yet dormant. June 1, leafing out. July 1, poor condition. October 15, small spindling growth, very poor condition.

Okabena: May 15, buds well advanced. June 1, full leaf, thrifty. July 1, 3 inches growth. August 1, 5 inches growth, healthy. October 15, 10 inches growth, healthy, wood soft.

Green Sweet: May 15, one tree, buds swelling. June 1, in leaf. July 1, 2 inches growth. August 1, affected by fungus, not doing well. October 15, 8 inches growth, healthy, wood very soft.

Patten: May 15, seven trees, well advanced. June 1, in full leaf, healthy appearance. July 1, 2 inches growth. August 1, 7 inches growth. October 1, 1 foot growth, wood fairly well hardened.

Jessie: May 15, seven trees, buds well advanced. June 1, full leaf, growing nicely. July 1, 4 inches growth, badly affected with leaf fungus. August 1, 7 inches growth. October 1, 1 foot growth, wood in fair condition, some leaf fungus.

Princess Louise: May 15, one tree, yet dormant. June 1, buds developing slowly. June 15, full leaf, unthrifty. August 1, very poor condition. October 15, very litle growth, unthrifty.

Duchess: May 15, ten trees, buds well advanced. June 1, full leaf vigorous, making growth. July 1, 4 inches growth, affected with fungus. October 1, 10 inches growth, wood rather soft.

Walbridge: May 15, one tree, yet dormant. June 1, buds swelling. June 15, in leaf, very unthrifty. August 1, healthy appearing, making growth. October 15, 15 inches growth, wood very soft.

North Star: May 15, two trees, buds swelling. June 1, in leaf, healthy. July 1, very little growth. August 1, 4 inches growth, affected by fungus. October 15, 1 foot growth, wood very soft.

Jeanette Winter: May 15, four trees, buds dormant. June 1, leafing out. June 15, in full leaf. July 1, very little growth. August 1, very bad condition, leaf fungus bad, sprayed. October 15, looks thrifty, no fungus, 3 inches growth, wood very soft.

APPLE TREES ON NATIVE STOCK, GRAFTED 1904.

Lowell: May 15, five trees, starting growth. June 1, in leaf, healthy appearance. July 1, 3 inches growth. August 1, leaves badly affected by fungus. October 15, 10 inches growth, wood very soft.

Duchess: May 15, rather backward. June 1, in leaf, leaves yellow. July 1, in poor condition. August 1, 3 inches growth. October 15, 4 inches growth, very poor condition.

Okabena: May 15, buds swelling. June 1, in leaf, leaves small, unthrifty. July 1, in poor condition. August 1, making some growth. October 15, in fair condition, growth short.

NEW GRAFTS.

Very few of the apple grafts grew. The scions were taken from trees grown here and the wood proved too soft for successful grafting.

APPLE TREES IN BREWERY LOT, DWARFS.

The dwarf trees have done better and present a much better appearance than standard trees of the same varieties planted near them. Of the nine varieties, Keswick Codlin is the most satisfactory. This variety starts growth early, and grows steadily throughout the season; the wood hardens and the leaves fall naturally before freezing weather.

Keswick Codlin: May 15, three trees, buds opening. June 1, full leaf, healthy. July 1, 3 inches growth. August 1, 1 foot growth. October 15, 15 inches growth, leaves falling, in good condition.

Sweet Bough: May 15, three trees, buds well advanced. June 1, full leaf, appears healthy. July 1, growth very slow. August 1, 6 inches growth. October 1, 1 foot growth, leaves falling, in fair condition.

Tetofsky: May 15, three trees, buds swelling. June 1, in full leaf, healthy. July 1, no new growth. August 1, 4 inches growth. October 15, 6 inches growth, poor condition.

Golden Sweet: May 15, three trees, making start. June 1, full leaf, healthy. July 1, 3 inches growth. August 1, 1 foot growth. October 1, 15 inches growth, leaves falling, in good condition.

Primate: May 15, two trees, rather backward. June 1, nearly full leaf. July 1, no growth. August 1, 3 inches growth. October 1, no additional growth, healthy appearance.

Early Harvest: May 15, three trees, well advanced. June 1, healthy appearing, no growth. July 1, 2 inches growth. August 1, 6 inches growth. October 15, 15 inches growth, in fair condition.

Fanny: May 15, three trees, very backward. June 1, in leaf, unthrifty. July 1, making some growth. August 1, 6 inches growth. October 15, 1 foot growth, leaves dropping, in fair condition.

Yellow Transparent: May 15, three trees, buds opening. June 1, healthy appearance, no growth. July 1, no growth. August 1, 6 inches growth. October 15, 1 foot growth, fair condition.

Red Astrachan: May 15, three trees, very little sign of growth. June 1, in poor condition. July 1, very unthrifty. August 1, nearly dead. October 15, made small growth, very poor condition.

STANDARD TREES.

Fanny: May 15, five trees, buds opening slowly. June 1, in leaf, unthrifty. July 1, 2 inches growth. August 1, 6 inches growth. October 1, 1 foot growth, in fair condition.

Golden Sweet: May 15, five trees, well advanced. June 1, but one tree appears thrifty. July 1, 3 inches growth. August 1, 8 inches growth. October 15, 1 foot growth, wood very soft.

Sops of Wine: May 15, five trees, yet dormant. June 1, four trees showing signs of life. June 15, very backward, in leaf. July 1, one tree dead, others alive. August 1, one tree making growth. October 15, very poor condition.

Summer Rose: May 15, five trees, badly injured by frost, yet dormant. June 1, two trees leafing out, others starting. July 1, two trees making growth, one dead, others in very unthrifty condition. August 1, in poor condition. October 15, very poor condition.

Sweet Bough: May 15, five trees, well advanced. June 1, four very thrifty, others coming on slowly. July 1, 2 inches growth. August 1, 8 inches growth. October 15, 1 foot growth, in fair condition.

Early Strawberry: May 15, five trees, badly winterkilled. June 1, two show signs of growth, others dead. July 1, one tree making growth. August 1, very unthrifty. October 1, one tree made some growth, wood very soft.

Benoni: May 15, five trees, well advanced. June 1, full leaf, thrifty. July 1, 2 inches growth. August 1, 6 inches growth. October 15, 1 foot growth, fair condition.

William Favorite: May 15, three trees, dormant. June 1, in leaf, unthrifty. July 1, one tree healthy, making 2 inches growth; one tree in bloom, unthrifty, making no growth. August 1, one tree made 6 inches growth, no fruit set. October 15, very poor condition.

Primate: May 15, five trees, injured by frost. June 1, in leaf, rather backward. July 1, making some growth. August 1, 2 inches growth. October 15, 6 inches growth, in fair condition.

Transcendent: May 15, trees in nursery row, buds opening. June 1, in full leaf. July 1, 4 inches growth. August 1, in poor condition. October 15, 1 foot growth, leaves falling, in fair condition.

CHERRIES.

The cherries, like the apples, were much injured by the heaving of the ground, tearing and exposing the root system, so that it was necessary to reset nearly every tree. No fruit set this season, there being so much rainfall that the blossoms were not fertilized.

The new growth was cut back in September, and some of the trees have been stripped of their leaves in order that the wood may harden.

It is difficult to say which of two varieties stands first. English Morello makes the most vigorous growth, but winterkills worse than the Early Richmond. These two easily lead.

English Morello: May 15, eight trees, yet dormant, badly injured by frost, much of last season's growth being entirely killed. June 1, starting slowly. June 15, blooming, very backward. July 1, two trees dead, four in bloom, two just leafing out. August 1, making good growth, very thrifty, yet blooming. October 15, growing vigorously, 3 feet growth, wood too soft to withstand freezing.

Early Richmond: May 15, twenty trees, very little signs of starting, badly winterkilled. June 1, buds beginning to open. June 15, in leaf, bloom beginning to open. July 1, in full bloom, trees very thrifty. August 1, strong, thrifty growth. October 15, 2 feet growth, wood very soft.

Ostheim: May 15, yet dormant. June 1, badly winterkilled, leaf buds slowly opening. June 15, bloom buds opening, leaves slow in developing. July 1, petals nearly all fallen, in full leaf. August 1, making thrifty growth. October 15, 2 feet growth, wood very soft.

Dyehouse: May 15, yet dormant, badly winterkilled. June 1, few individuals leafing out. June 15, very backward, few bloom buds. July 1, in poor condition. August 1, making strong growth. October 15, 18 inches growth, very soft.

Sand Cherry: May 15, buds swelling. June 1, in leaf. July 1, 2 inches growth, in full bloom. August 1, 6 inches growth, no fruit set. October 15, 10 inches growth.

Juneberry: May 1, buds swelling. May 15, full leaf. May 23, in bloom. June 1, very thrifty, full bloom. July 1, 4 inches growth, still blooming, fruit setting well. August 1, 6 inches growth, yet blooming. October 15, 15 inches growth, fruit small and inferior in quality, many root suckers.

PLUMS.

Of the dozen varieties of plums now in the nursery, but one proved worthy of cultivation. The May Day stands far superior to the other varieties.

May Day: May 1, three trees, buds well advanced. May 15, in full leaf. May 20, in bloom. June 1, 4 inches growth. June 15, fruit failed to set. July 1, 8 inches growth. August 1, 18 inches growth. October 15, leaves falling naturally, wood well hardened, in excellent condition.

Forest Garden: May 15, one tree, buds swelling. June 1, in leaf. July 1, 3 inches growth. August 1, 4 inches growth. October 15, poor condition.

Tomahawk: May 15, one tree, buds swelling. June 1, leafing out but backward. July 1, growing but little. August 1, 4 inches growth. October 15, in good condition.

Sayles: May 15, two trees, well advanced. June 1, full leaf, thrifty. July 1, 4 inches growth. August 1, 15 inches growth. October 15, 2 feet growth, wood very soft.

Hawkeye: May 15, two trees, well advanced. July 1, 4 inches growth. August 1, 15 inches growth. October 15, 2 feet growth, wood very soft.

Odegard: May 15, five trees, buds opening. June 1, full leaf. July 1, 3 inches growth. August 1, 10 inches growth. October 15, 18 inches growth, in good condition.

Wyant: May 15, two trees, buds opening. June 1, in leaf. July 1, 4 inches growth. August 1, 18 inches growth. October 15, 3 feet growth, wood very soft.

Desota: May 15, four trees, buds swelling. July 1, 4 inches growth. August 1, 15 inches growth. October 15, 18 inches growth, wood very soft.

Rollingstone: May 15, one tree, buds opening. July 1, 5 inches growth, leaves somewhat blighted. August 1, 18 inches growth. October 15, 2 feet growth, wood rather soft.

Scout: May 15, one tree, rather backward. June 15, bloom buds well developed. July 1, full bloom, 2 inches growth. August 1, 5 inches growth, no fruit set. October 15, 6 inches growth, good condition.

Mixed Americana: May 15, sixty-five trees, badly frozen back, backward in starting. July 1, 4 inches growth. August 1, 18 inches growth. October 15, 2½ feet growth, wood very soft.

Seedling of Wyant: May 15, nineteen trees, very backward, badly winterkilled. June 1, leafing slowly. July 1, 5 inches growth. August 1, 18 inches growth. October 15, 3 feet growth, wood very soft.

Seedling of Cherry Plum: May 15, thirty-five trees, badly winterkilled, backward in starting. July 1, 4 inches growth. August 1, 18 inches growth. October 15, 2 feet growth, wood very soft.

GOOSEBERRIES.

Of the American varieties, Smith Improved has proven the best. It makes a better growth and the wood becomes more mature than that of other varieties.

Smith Improved: May 1, buds well advanced. May 15, full leaf, in bloom. July 1, 6 inches growth. August 1, 1 foot growth, fruit ripening. October 15, leaves falling, wood in good condition, fruit sweet and good, skin smooth and thin.

Champion: May 1, buds opening. May 15, in full leaf bloom. June 1, fruit well set. July 1, 4 inches growth, a few branches blighted by fungus. August 1, no additional growth, fruit sweet and good, skin tough and leathery. October 1, no additional growth, have a healthy appearance.

Red Jacket: May 1, buds swelling. May 15, full leaf, does not appear thrifty. June 1, blooming. June 15, fruit well set. July 1, 2 inches growth, fruit nearly

full size. August 1, thrifty looking, no additional growth. August 15, fruit juicy, rich and of good quality, skin rather tender. October 15, 4 inches growth in fair condition.

Native Black Gooseberry, from Skagway: May 1, well advanced. June 1, in bloom. July 1, 1 foot growth, failed to set fruit. August 1, 2 feet growth. October 15, no additional growth, leaves falling.

Of the English varieties none equals the Whitesmith. It makes its growth early, maturing the wood; it bears heavily and produces a large, well-flavored berry, though it has a thick skin.

Whitesmith: May 1, buds opening. May 15, full leaf, in bloom. June 1, fruit well set. July 1, 5 inches growth. August 1, no additional growth, fruit excellent, fruit picked in September, some seeds planted and some stratified.

Triumph: May 1, buds opening. May 15, full leaf, not vigorous, few blooms. June 1, plants rather backward, some fruit. August 1, 4 inches growth, fruit smooth, large, good. October 15, 6 inches growth.

Columbus: May 1, yet dormant. May 15, leafing out. June 1, full leaf, few blooms. June 15, no fruit set, very backward. October 15, made no growth, poor condition.

Industry: May 1, buds swelling. May 15, in leaf, full bloom. June 1, some fruit set. July 1, 3 inches growth. August 1, 4 inches growth. October 15, in fair condition.

CURRANTS.

Of the black currants grown at this station Lee Prolific is the most hardy. It is as productive as the Russian Black or Champion and the fruit is much superior to them in flavor. The black currants have proven a little too tender for this climate and are rather scant bearers. They also suffer badly from a fungus.

Lee Prolific: May 15, well advanced. June 1, full leaf, in bloom. June 15, fruit not well set, bushes thrifty. July 1, 1 foot growth. August 1, 2 feet growth, somewhat affected by leaf fungus. August 24, fruit gathered. October 15, leaves dropping, wood in better condition than other black varieties.

Russian Black: May 15, buds opening. June 1, full leaf, in bloom. June 15, very little fruit set, bushes thrifty. July 1, 15 inches growth. August 1, 2 feet growth, leaf fungus quite bad. August 24, fruit picked. October 15, leaves dropping, wood in fair condition, growth more upright than other varieties.

Champion: May 15, buds opening. June 1, very thrifty, in bloom. June 15, some fruit setting. July 1, 1 foot growth. August 1, 2 feet growth. August 24, fruit picked, large berries, mild flavor. October 15, 3 feet growth, wood very tender.

Common Black: May 15, buds opening. June 1, thrifty. July 1, 1 foot growth, in bloom, badly affected with mildew. August 1, 3 feet growth, no fruit set, bushes thrifty. October 15, leaves dropping, wood rather soft.

Native Black, from Sunrise: May 15, rather slow in starting. June 1, in leaf, some plants seem thrifty, few blooms. July 1, 4 inches growth, some fruit. August 1, 8 inches growth, fruit dropped. October 15, 1 foot growth, in good condition.

Native Wild Black: May 1, buds well advanced. May 15, in leaf. July 1, 18 inches growth. October 15, 2 feet growth, leaves falling, wood in good condition.

Manitoba Amber: May 1, buds well advanced. June 1, full leaf. July 1, half of the bloom killed by mildew, 18 inches growth. August 1, 2 feet growth, fruit ripening. October 15, growth rather tender.

Seedlings of Kenai native: May 1, badly injured by heaving, reset. May 15, plants making a start. July 1, 4 inches growth. October 15, 15 inches growth, in good condition, too small to fruit.

Red Cross has given the best results of the red varieties grown here. It is an upright grower of medium height. Here it is hardy, the fruit is somewhat acid but of good size and color. The clusters are medium.

Red Cross: May 1, buds swelling. May 15, in leaf. June 1, full leaf, beginning to bloom. July 1, 6 inches growth. August 1, 15 inches growth, fruit ripening. August 23, fruit picked. October 15, 18 inches growth, leaves dropping, wood in good condition.

Wilder: May 1, dormant. May 15, starting. June 1, full leaf, some bloom. June 15, very little fruit. July 1, 6 inches growth. August 1, 1 foot growth. August 24, fruit ripe, very poor. October 15, 18 inches growth, leaves falling, wood in good condition.

Ruby Castle: May 15, buds opening. June 1, full leaf, few blooms. June 15, very little fruit. July 1, 1 foot growth. August 1, 2 feet growth, leaves rather yellow. August 24, fruit ripe, small berries, poor flavor. October 15, leaves dropping, wood in good condition.

Victoria: May 1, dormant. May 15, in leaf. June 1, blooming. June 15, fruit well set. July 1, 1 foot growth. August 1, 18 inches growth, fruit ripening. August 24, fruit picked, berries small, poor flavor. October 15, leaves falling, wood in good condition.

Fay: May 1, dormant. May 15, buds opening. June 1, in bloom. July 1, 15 inches growth. August 1, 2 feet growth. August 24, fruit picked, small berries very acid. October 15, in good condition.

RASPBERRIES.

On the station grounds are grown seven varieties of red raspberries, of which the Cuthbert stands as the best. It is the only variety that really comes to perfection here. The others have as yet not proved of much value. The wet weather prevents perfect fertilization and in consequence the berries are few and not well developed.

Cuthbert: May 1, dormant. May 15, buds swelling. June 1, in leaf. July 1, in bloom, making good growth. August 1, new canes 4 feet high. August 15, fruit ripening. October 7, last fruit picked. October 15, canes 6 feet long, plants suckered freely.

Turner: May 1, canes injured by freezing. May 15, buds swelling. June 1, leafing, rather backward. July 1, beginning to bloom. August 1, new canes 3 feet long, fruit small and poorly set. September 15, fruit not worth picking. October 15, canes 5 feet long, leaves falling, wood in good condition, very few suckers.

Fuller: May 15, very backward. June 1, leafing out, tips slightly winterkilled. July 1, blooming freely. August 1, new canes 3 feet high, poor, bloom imperfectly fertilized, yet blooming. September 15, fruit not worth picking. October 15, new canes 4 feet long, suckers more freely than the Turner.

Miller Favorite: May 15, yet dormant. June 1, leafing out, very backward, tips of canes winterkilled. July 1, few blooms. August 1, new growth short, fruit very poor. October 15, new growth 3 feet, very few sprouts, fruit not worth picking.

Loudon: May 15, buds swelling. June 1, leafing, rather backward, slightly winterkilled. July 1, blooming freely. August 1, new canes 2 feet high, fruit small but better than Fuller. October 15, canes 3 feet long, wood very soft, very few suckers.

Champlain: May 15, dormant. June 1, leafing, slightly winterkilled. July 1, making good growth, flower buds in abundance. August 1, new canes 3 feet, fruit small and inferior. October 15, new canes 5 feet high, wood very soft, very few suckers.

Orange: May 15, dormant. June 1, backward. July 1, some growth, few flower buds. August 1, new canes 2 feet long, fruit poor. October 15, new canes 3 feet long, wood soft, few suckers.

Superlative: May 15, dormant. June 15, in full leaf. July 15, in bloom. August 1, new growth 2 feet long, fruit very poor, yet blooming. October 15, new growth 4 feet long, wood tender, few suckers.

Native Salmon Berry (*Rubus spectabilis*) × Cuthbert seedlings: Doing fairly well; some made growth of 3 feet; plants vary greatly; none have been planted in the open ground as yet.

POTATOES.

The potatoes were planted from May 15 to 18, inclusive, and were all up by June 15. The stand was good, though all were slow in coming through the ground. Some were affected with a fungus which attacked the vine at the ground and worked downward to the tuber, starting it to rot. The yield this season was not normal, owing to the cool summer and overabundance of rain. The tubers run more even in size with a greater percentage of first grade than in former seasons.

Of the varieties which have been grown here for some years the Freeman gives the most satisfactory results. It is the earliest maturing and the heaviest yielder. This season it yielded at the rate of 225 bushels per acre, with 60 per cent first, 20 per cent second, and 20 per cent third grade.

Garfield: Yielded at rate of 130 bushels per acre, with 50 per cent first, 25 per cent second, and 25 per cent third grade.

Extra Early Ohio: Rate of yield per acre, 103 bushels, 50 per cent being first, 21 per cent second, and 29 per cent third grade.

Norway No. 1: Late this season; potatoes dug October 3, rate of yield 325 bushels per acre, 80 per cent first grade.

Norway No. 2: Later this season than last; dug October 12, 80 per cent first class, yield at the rate of 317 bushels per acre.

Norway No. 3: Dug October 12, 60 per cent first class, yield at rate of 171 bushels per acre.

Lincoln: Not a good potato, rather small; dug September 23, yield at rate of 142 bushels per acre, 40 per cent first class.

Eureka: Practically a failure, very few and poor.

Early Harvest: Somewhat affected by fungus disease; potatoes dug September 23, yield at the rate of 38½ bushels per acre, 60 per cent first grade.

Red River White Ohio: The tops were small, though they appeared healthy; these yielded at the rate of 31 bushels per acre, all first grade.

Extra Early Pioneer: This variety was the earliest to come through the ground; rate of yield 60½ bushels per acre, 60 per cent first grade.

Pat's Choice: Very poor, practically a failure; all potatoes third grade.

Carmen No. 3: Made better showing this season than ever before; rate of yield 128 bushels per acre, 90 per cent first grade.

Early Ohio: Rate of yield 63 bushels per acre, 70 per cent first grade. The plants were very vigorous throughout the season.

Ohio Jr.: Plants smaller than other varieties of Ohio, all first grade; rate of yield 97 bushels per acre.

Irish Cobbler: Very poor, no first grade potatoes; rate of yield 31 bushels per acre.

Bovee: Strong thrifty vines; rate of yield 60 bushels per acre, 50 per cent first, 34 per cent second, and 16 per cent third grade.

Burpee Early: Not a first-class potato. The plants were small; rate of yield 72½ bushels per acre, 40 per cent first, 30 per cent second, and 30 per cent third grade.

Early Market: Considerably affected by stem rot; rate of yield 180 bushels per acre, 60 per cent first, 30 per cent second, and 10 per cent third grade.

Vornehm: Most thrifty looking plants in the field; rate of yield 106 bushels per acre, 70 per cent first, 22 per cent second, and 8 per cent third grade.

White Beauty: Plants very small though strong appearing; rate of yield 55 bushels per acre.

Extra Early Triumph: Above the average in growth of vine; yield at the rate of 80 bushels per acre, 70 per cent first, 20 per cent second, and 10 per cent third grade.

White Mammoth: Plants small, affected by stem rot; rate of yield 52 bushels per acre, 40 per cent first, 28 per cent second, and 32 per cent third grade.

Early Michigan: A strong grower, a few hills killed by stem rot; average yield 60½ bushels per acre, 70 per cent first, 20 per cent second, and 10 per cent third grade.

Hamilton Early: Plants small, many hills killed by stem rot; yield averaged 43½ bushels per acre, 40 per cent first, 40 per cent second, and 20 per cent third grade.

Extra Early: Vines very vigorous; yield at rate of 108 bushels per acre, 70 per cent first, 25 per cent second, and 5 per cent third grade.

Gold Coin: Plants smaller than average; yield at rate of 70 bushels per acre, all first grade.

Banner: Very slow in coming up, plants very small and spindling; yield at rate of 75 bushels per acre, 30 per cent first, 40 per cent second, and 30 per cent third grade.

Vigorosa: Plants very uneven in growth, some killed by root rot; yield at rate of 34 bushels per acre, 20 per cent first, 70 per cent second, and 10 per cent third grade.

PEAS.

Russian Pea No. 20911: Planted June 10. July 1, good stand 4 inches high. August 1, 2 feet high, beginning to bloom. September 1, not many pods setting. September 20, picked 5 pounds. October 9, picked 4 pounds, vines killed by frost October 16, vines about 6 feet high. A strong grower but a light producer. The pods are medium long and well filled.

Russian Pea No. 20912: Planted June 10. July 1, good stand, 4 inches high, August 1, 2 feet high, few blooms. September 1, 5 feet high, yet blooming. very few pods. These peas grew over 5 feet high and are light bearers here. The pods are large, but the pea grows slowly. None were ready for use when frozen October 16.

TURNIPS.

Petrowski Turnip No. 19554: Planted June 15, were up by July 1, made a slow growth. This is a round smooth yellow turnip of excellent quality, tender and juicy. It was uninjured by a root maggot which practically destroyed all other varieties of turnip.

Gratscheff Turnip No. 19555: This turnip has a bright red skin, is flat and somewhat ribbed. It reaches a larger size than the yellow; root maggots worked on it badly.

Iceland Turnip No. 19795: Planted June 15. August 1, average growth with other varieties; worked on badly by root maggot. This turnip greatly resem-

bles ruta-bagas in color and form of leaf and general appearance. Ruined by root maggot.

Turnip No. 20483: Much the same in every way, form of growth and general appearance, as Iceland turnip No. 19795. A description of one answers perfectly for the other.

Purple Top Strap Leaf: Planted June 15. Made a good growth until attacked by root maggot.

STRAWBERRIES.

Native Yakutat: May 1, good condition, starting growth. June 1, bloom buds well developed. June 15, in bloom. July 1, yet blooming, fruit setting well. July 24, first ripe fruit picked. August 1, ripening freely. October 15, in good condition, not so many new plants as usual.

Hollis: May 1, plants much injured by frost heaving the ground. May 15, plants pressed into place and starting growth. June 1, bloom buds well advanced. June 15, in bloom. July 1, blooming freely, fruit setting well. July 24, first ripe fruit picked. August 1, fruit ripening freely, berries ill shaped. October 15, in excellent condition for winter, large number of new plants.

Bismarck: Transplanted July 15. October 15, in good condition, many new plants.

Enhance: Transplanted July 15. October 15, in good condition, very few new plants.

Magoon: Transplanted June 1. August 1, making good growth, but not many runners. October 15, in good condition, few new plants.

Hybrid Hollis × Yakutat: July 20, transplanted to open ground. October 15, good strong plants, in good condition; resemble the Yakutat berries in form of plant and habit of growth.

ORNAMENTALS.

Rosa rugosa: May 15, uninjured by frost, buds swelling. July 1, growing thriftily, in bloom. July 15, branches layered to strike root, green cuttings placed in the forcing house with bottom heat failed to root. August 1, plants blooming freely. October 15, some plants yet blooming, seeds picked; some planted in flats, remainder stratified in sand.

Niobe willow: May 15, last season's growth killed back one-half, starting slowly. June 1, in leaf, rather slow. July 1, 1 foot growth. October 15, 4 feet growth, wood very soft, hardwood cuttings put out in the spring have done well.

Mountain ash: May 15, uninjured by frost, buds swelling. June 1, leafing out. July 1, 18 inches growth. October 15, 3 feet growth, good condition, seedlings growing nicely.

Siberian sandthorn: May 15, little signs of starting. June 1, very backward, leafing out. July 1, 4 inches growth. October 15, leaves falling, wood well hardened.

Tartarian honeysuckle: May 15, buds well advanced. July 1, full bloom, 1 foot growth. October 15, 15 inches growth, seeds picked and planted, leaves falling, wood well hardened.

Siberian pea tree (*Caragana arborescens*): May 15, very little signs of growth. June 1, leafing out, rather backward. July 1, 4 inches growth. October 15, 15 inches growth, leaves falling, wood well hardened.

Eglantine: May 15, killed to the ground. June 15, starting growth. October 15, 2 feet growth, wood very soft.

Basket willow: May 15, tips winterkilled, buds swelling. July 1, 6 inches growth. October 15, 3 feet growth, hard wood cuttings put out in spring all grew, soft wood cuttings put out July 20 all grew.

Lilac: May 15, buds swelling. July 1, 3 inches growth. October 15, 15 inches growth, wood rather soft.

REPORT OF WORK AT RAMPART STATION FOR 1907.

By FREDERICK E. RADER, *Superintendent.*

Continuing the narrative of building operations in 1906, the log stable and tool shed then being built was so far completed by October 3 that it was put to use. The weather in October was unusually fine and the exterior of the cottage was completed, with the exception of a few finishing touches, and given a priming coat of paint by October 18. Work was then begun on the interior—the floors were laid, the cottage sheathed on the inside, and some of the partitions put in place. November 16 we moved into it and nearly all the remaining finishing work was done in the course of the winter (Pl. IV, fig. 1). It is a frame structure and we were somewhat apprehensive as to whether it could be kept comfortably warm during the winter, but it proved an entire success, as did also the cellar underneath the house. In the latter the thermometer registered between 32 and 34° F. the entire winter. During the very coldest weather a lamp was put in the cellar for a few hours at a time.

The remainder of the time during the winter was taken up with cutting and hauling wood and caring for the station team. No new buildings were erected during the summer, and no additions were made to the equipment of tools.

One laborer was employed from May 23 until October 1. On August 5 Mr. J. W. Gasser came to take charge of the station during the superintendent's absence the coming winter on a vacation. During August the superintendent assisted Prof. C. C. Georgeson in the preliminary work at Fairbanks. He returned to Rampart August 30 and remained at the station until September 14, when he started for the outside.

CLIMATIC CONDITIONS.

The autumn of 1906 was a good one. September was a fine month and the thermometer did not reach zero until October 20. There was very little snow before the end of the month. The winter was not marked by any long periods of low temperatures, —59° F. being the coldest, but frequent high winds made it disagreeable to be out of doors and drifted the snow so badly that it was difficult to keep trails open. Snow fell to a depth of 48 inches during the winter, which is more than the average. The preceding winter had the same amount.

By May 1 the snow was so far gone that sledding had to be discontinued and conditions pointed toward an early spring; but cold, frosty weather during the middle of the month checked the thawing and drying out of the ground to such an extent that plowing could not be started until May 21. The ice in the river broke May 9. This is the earliest breakup so far recorded.

The summer of 1907 could scarcely be called an average one. During July there was not one clear day and rain fell in measurable quantities on twenty days; and likewise, out of the last eighteen days of August there was more or less precipitation on sixteen of them. During the night of July 31 and August

1 there was a rainfall of 1.97 inches, an unusually heavy rain for this season of the year. It caused some of the grain to lodge so badly that it never straightened up again. Also September 11 and 12 there were 1.25 inches of rain.

In the following table is given a summary of the weather record for the three growing months, June (21 days only for 1905), July, and August, for three years:

Summary of weather during growing season at Rampart.

	1905.	1906.	1907.
Maximum temperature, degrees F	96	84	85
Average mean temperature	55.1	57.8	56.9
Number of days with 0.01 inch or more precipitation	31	22	47
Rainfall, inches	5.57	4.41	7.31
Number of clear days	19	23	22
Number of partly cloudy days	34	31	37
Number of cloudy days	30	38	33

The total rainfall of 7.31 inches for the three months of 1907 may not seem excessive, but it fell in frequent showers, and then, too, it must be borne in mind that it requires only a comparatively small amount of moisture in addition to that supplied by the constantly thawing ground to make the soil wet; and wet ground is cold, especially in this latitude. The average total annual precipitation is less than 12 inches.

The first killing frosts did not occur until September 6 and 7, when the thermometer fell to 24° and 20° F., respectively.

WORK OF THE SEASON.

The summer's work may be briefly summarized as follows: Seeding, caring for, and harvesting the crops; improvement of the road from the river to the station buildings; cutting out a screen of timber between the river and the site where the buildings and cleared ground are located; grading around the cottage; clearing new land; making hay to winter the team; and plowing all the cleared land in readiness for next season's crops.

A horse stump puller was used this year and it proved a great success. Owing to the very frequent showers, the moss and trash on the ground were kept almost constantly too wet to burn and the progress made at clearing new land was most unsatisfactory. Burning is depended upon to get rid of the moss, dead grass, weeds, etc., before the land can be cleared up for the plow. There is usually during the summer several dry periods when this can be done, but this year was an exception. The stumps have been pulled on several acres which could not be gotten ready for the plow, and preparations have been made for burning over a considerable area next year should the weather be dry enough at any time.

Cutting out the small timber between the station grounds and the river has made a great improvement in the appearance of the station, and it was the cause of much favorable comment this summer.

GRAIN CROPS, GRASSES, AND VEGETABLES.

Plowing was begun on May 21, and the principal part of the seeding was done on May 24, 25, and 27. Such of the land as did not dry out in time to be seeded to grain crops was sown to common oats. This, with such grain as did not ripen, was cut for hay. Notwithstanding the somewhat unfavorableness of the season, the grains did well. The failures were either new grains being tried for the first time or else those that have not matured heretofore. The damp, cloudy

weather during the latter part of August retarded ripening very much, but ten days of nice weather in September cured splendidly those varieties which did ripen.

The land was cropped this year for the third time and a very great improvement was noticeable in its productiveness. Aside from the garden very little of the land has been fertilized at all. The grain this year grew to a uniform height and the heads were of good length. This is a very encouraging feature. It shows what a beneficial effect cultivation alone has upon this soil.

WINTER GRAIN.

A small quantity of each of the following varieties of winter grain were seeded August 25, 1906: Kharkov winter wheat No. 12001,[a] winter barley from Bulgaria No. 521, winter barley from Bulgaria No. 522, Tennessee winter barley, winter rye No. 11268, and Snoma winter oats No. 274. The seeding was made too late for this latitude, but the seed did not arrive until the above date, and the grains had a very poor start. It is not surprising, therefore, that only one variety survived the winter. It was the Kharkov wheat, and that can be accounted for perhaps because of the heavier covering of snow which it had. This is the first time in the history of the station that winter rye failed to live through the winter.

The following is noted regarding the Kharkov wheat: July 1, 20 to 24 inches high and heading; July 12, in bloom; August 25, first heads ripe; August 31, part of plat ripe and cut. The straw was about 36 inches high, the heads of good length, and the grain large and plump.

The following winter grains were seeded in 1907: August 6, winter emmer No. 19385; August 16, winter barley No. 386, winter barley No. 521, winter barley No. 522, Excelsior winter rye—Rampart seed, Amber winter rye—Rampart seed, Giant French winter rye—Rampart seed, winter rye No. 11268, Kharkov winter wheat—Rampart seed, Kharkov winter wheat No. 12001, Snoma winter oats No. 274. All of the above came up in from eight to ten days after seeding and made a good growth (Pl. V, fig. 1).

SPRING GRAIN.

Sixty-day oats: Seeded May 24; up June 6; July 9, heading; July 19, blooming; September 3, a few heads ripe; September 9, proved badly mixed with other varieties, cut for feed. It was hoped that this would prove a more promising variety. However, we have some pure seed now and it will be given another trial.

Swedish Select oats, from Copper Center Station: Seeded May 24; up June 3; July 13, 24 inches high, heading; July 29, in bloom; September 5, some of the ripest heads cut, 56 inches high, partially lodged; September 9, cut for feed. The plat as a whole did not get ripe but the heads which were selected will be seeded next year.

Banner seed oats, from Copper Center Station: Seeded May 24; up June 6; July 16, heading, 20 inches high; July 29, in bloom; September 5, ripest heads cut, 48 inches high, stands up well. Will be given another trial.

Finnish Black oats, from Copper Center Station: Seeded May 24; up June 4; July 13, height 22 inches, heading; July 27, in bloom; September 5, mostly ripe; September 9, cut. The ground had been fertilized some and was too rich. The oats grew too tall and lodged badly. It was an average height of 60 inches.

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[a] The numbers refer for most part to U. S. Department of Agriculture, Seed and Plant Introduction numbers.

FIG. 1.—FALL PLOWING, RAMPART STATION.

FIG. 2.—PUTTING IN OAT HAY, RAMPART STATION.

Burt Extra Early oats, from Copper Center Station: Seeded May 24; up June 4; July 6, height 20 inches, heading; July 13, fully headed; July 19, in bloom; September 1, first heads ripe; September 5, half of grain ripe. This is a small, slender-strawed variety and it always ripens unevenly.

Russian oats No. 10624: Seeded May 24; up June 7; July 19, heading; August 11, in bloom; September 7, did not ripen, injured by frost, cut for feed.

Burt Extra Early oats, Rampart seed: Seeded May 24; up June 7; July 10, heading; July 20, in bloom; September 3, half of grain ripe. It was badly mixed with barley and another variety of oats and was cut for feed (Pl. V, fig. 2).

Romanow wheat, from Hot Springs: Seeded May 24; up June 2; July 16, heading, height 22 inches; July 27, in bloom; September 5, some of the ripest heads selected; September 9, did not ripen, cut for feed. Ten days more of good weather would have ripened this variety. Will try to grow it again from the heads selected. The heads were very large; they had from three to seven grains to the spikelet and there were from ten to sixteen spikelets to the head.

Kubanka wheat, South Dakota Experiment Station, No. 5639: Seeded May 24; up June 5; July 13, height 24 inches, heading; July 29, in bloom; September 9, did not ripen.

Wheat No. 2398, from Galgalos, Caucasus: Seeded May 25; up June 3; July 14, height 20 inches, heading; July 29, in bloom; September 9, grain in soft dough, did not ripen, cut for feed.

Arnantka wheat, South Dakota Experiment Station: Seeded May 27; up June 6; August 11, in bloom; September 9, grain in soft dough, cut for feed.

Ghirka wheat, South Dakota Experiment Station, No. 1517: Seeded May 27; up June 5; July 18, height 18 inches, heading; July 27, in bloom; September 7, grain in soft dough, injured by frost, cut for feed.

Barley from Pamir No. 18922: Seeded May 24; up June 3; July 5, heading, 18 inches high; July 15, in bloom, height 28 inches; August 25, ripe; August 31, cut. This variety was grown for the first time this year and seems a very promising sort. The straw is short and thick and the heads are small.

Swedish barley No. 19557: July 1, height 22 inches, a few heads showing; July 19, beginning to bloom; August 23, first heads ripe; September 3, ripe and cut. It was seeded May 24 and came up June 2. This is an early variety tried for the first time this year. The straw grew to an average height of 40 inches and stood up well, and the heads were of good size and plump.

Barley No. 360, from Abyssinia: Seeded May 24; up June 3; July 10, heading; July 16, beginning to bloom; August 30, first heads ripe; September 3, ripe and harvested. It grew to an average height of 36 inches and has a medium length, plump head.

Barley No. 361, from Abyssinia: Seeded May 24; up June 2; July 9, heading; July 16, beginning to bloom; August 30, ripe heads selected; September 3, harvested. This is similar to No. 360.

Barley No. 362, from Abyssinia: Seeded May 25; up June 4; July 9, heading; July 13, half headed, height 26 inches; July 16, beginning to bloom; September 3, ripe and cut, grew to an average height of 36 inches. A black, two-rowed variety. All of the barleys from Abyssinia were grown this year for the first time and they seem very promising.

Barley No. 10583: Seeded May 25; failed to germinate.

Barley No. 10585: Seeded May 25; did not germinate.

Barley No. 10754: Seeded May 25; up June 5; July 13, heading, best 24 inches high; July 25, in bloom; September 5, ripe and cut. Thirty-six inches high, lodged some, good heads, a promising variety.

Barley No. 12709: Seeded May 25; up June 5; July 13, heading, height 22 inches; August 9, in bloom; August 30, grain mostly ripe; September 3, cut. This is a beardless variety and the first one so far tried. The station has had many inquiries regarding beardless barley and this may prove a good variety. It has a very soft, brittle straw, which may be a serious objection to it. It was blown flat to the ground by the storm of August 1 and never straightened up again.

Barley No. 15829: Seeded May 24; up June 4; September 5, only an occasional head showing. From the manner of growth this is evidently a winter variety. There was no description with the seed to indicate whether it was a spring or winter variety.

Lapland barley, Rampart seed: Seeded May 24; up June 5; July 13, average height 18 inches, beginning to head; July 23, in bloom; September 3, part of plat ripe; September 5, harvested, average height 42 inches. For some reason it ripened unevenly, perhaps because of some peculiarity of the soil. This variety has never failed to ripen.

Manshury barley, Rampart seed: Seeded May 24; up June 3; July 10, heading; July 19, blooming; August 31, ripe and part of plat cut; September 2, finished cutting. This is one of our very best varieties and it never fails to ripen. It grew to an average height of 40 inches, the heads were of good length and very plump (Pl. VI, fig. 1).

Emmer No. 1529: Seeded May 24; up June 4; July 16, heading; July 27, in bloom; September 9, grain in soft dough, did not ripen.

Einkorn No. 10474, South Dakota Experiment Station: Seeded May 27; up June 7; June 29, heading; August 16, blooming; September 5, still blooming, did not ripen.

Red Orenburg Proso No. 9423, Red Voronezh Proso No. 9424, and Black Voronezh Proso No. 9425 were seeded May 27 and came up June 15. They grew scarcely any until near the end of the season, reaching a height of about 6 inches. An occasional head came out but did not reach maturity. The common name for this plant is hog millet.

SELECTED GRAIN.

An effort is being made to propagate earlier maturing varieties of grain each year by selecting the earliest ripening heads of a variety and continuing the selection for a number of years. This was begun in 1906 with the following varieties, the selected seed of which was grown separately, and from these plats the earliest ripening heads were again selected for seeding next year. Of course, it is too soon yet to notice any real difference in the earliness of ripening.

Lapland barley, select seed cut August 20, 1906: Seeded May 24; up June 4; July 10, heading; July 16, beginning to bloom; August 23, first heads ripe; August 28, ripe; August 31, most of plat cut. It was grown on a piece of extra good ground and reached a height of 60 inches, was lodged some by storms. The heads were extra large and plump.

Manshury barley, select seed cut August 27, 1906: Seeded May 24; up June 2; July 10, heading; July 18, in bloom; August 24, first heads ripe; August 28, grain ripe; August 31, harvested. It grew to a uniform height of 42 inches and the heads were fine and large.

Burt Extra Early oats, selected seed: Seeded May 24; up June 5; July 9, heading; July 20, in bloom; September 5, three-fourths of plat ripe, cut, height 30 inches. This variety always ripens unevenly and it is hoped that it can be improved by seed selection.

Finnish Black oats, selected seed: Seeded May 25; up June 4; July 13, height 16 inches, heading; July 25, in bloom; August 23, first heads ripe; September 3, ripe; September 5, harvested. Grew to a uniform height of 48 inches and stood up perfectly. The best variety we have yet tried (Pl. VI, fig. 2).

GRASSES.

The following grasses were seeded June 13, 1906, and they made a fairly good growth during the season. They have come through the winter with the following results:

Kentucky blue grass (*Poa pratensis*): This grass started very early; in fact, as soon as the snow was gone it began to get green. June 25 the seed stalks were 22 inches high; July 13, ready to be cut for hay, not a very heavy crop, height 28 inches; July 25, seed ripe; August 8, cut for seed.

Redtop (*Agrostis alba*): Very late in starting to grow; reached a height of 28 inches, light crop; seed ripe September 5.

English blue grass (*Festuca pratensis*): June 25, heading, 20 inches high, good amount of forage; July 10, ready to be cut for hay, height 30 inches, would make good hay crop; August 8, cut for seed.

Meadow foxtail (*Alopecurus pratensis*): Began heading June 7, when 10 inches high; June 25, height 30 inches, fair amount of leaves; July 1, ready to be cut for hay, height 36 inches; July 20, seed ripe; August 8, cut for seed. This is the earliest maturing of all the varieties under trial.

Tall meadow oat grass (*Avena elatior*): June 25, three-fourths winterkilled, some in head and 24 inches high; July 31, could be cut for hay, height 54 inches, not relished by stock for some reason.

Orchard grass (*Dactylis glomerata*): June 25, height 6 to 10 inches, not doing well. It did not head at all.

Timothy (*Phleum pratense*): June 25, heading, 10 inches high; August 26, cut for seed. This grass does not produce forage enough to make a good hay crop, but it might do better under more favorable conditions.

Awnless or smooth brome grass (*Bromus inermis*): June 25, slightly winterkilled, 22 inches high, heading; July 20, in bloom; September 3, seed ripe. This is a splendid grass for hay, would give a larger yield than any of the other varieties.

Tall meadow fescue (*Festuca elatior*): June 25, did not germinate well when seeded but apparently stood the winter perfectly, 24 inches high and heading; July 16, ready to be cut for hay, 48 inches high, not many leaves, mostly stems; August 26, cut for seed.

Meadow soft or velvet grass (*Holcus lanatus*): June 25, practically all winterkilled.

Perennial rye grass (*Lolium perenne*): June 25, half winterkilled, not doing well, 10 inches high, heading. It did not amount to anything.

VEGETABLES.

Early Rose potatoes: Planted May 29; up June 15; July 20, blooming; dug September 7 and 9. Yield about nine-fold.

Burbank potatoes: Planted May 29; up June 15; August 10, in bloom; September 7, dug. The yield was eight-fold. The seed of both varieties was grown at the station in 1906, but in both yield and size the potatoes this year are inferior to last year's crop (Pl. IV, fig. 2). They keep perfectly in the winter.

Lettuce: The following varieties were seeded at intervals in the early part

of the season and furnished an abundance of fine, crisp lettuce the entire summer: Morse, Black Seeded Simpson, Philadelphia Butter, and Immensity. Of these varieties the first two are the best.

Radish: Early Scarlet Turnip, a well known variety, was seeded at intervals and furnished a succession of crops.

Crimson Globe beet: Seeded May 28; up June 12; August 12, large enough to use. A desirable variety, of good size for table use.

Edmand Blood Turnip beet: Seeded May 28; up June 12; grows larger, coarser tops than the above, not so fine fleshed and more prone to produce seed stalks.

Early Red Flat onion: Seeded May 28; up June 15; seed germinated poorly.

New White Queen onion: Seeded May 28; up June 15; germinated well and produced onions large enough for sets.

Hollow Crown parsnip: Seeded May 28; up June 16. Grew roots of fair size.

Scarlet Horn carrot: Seeded May 28; up June 18; seed germinated well and produced roots of good size, and excellent quality.

Japanese carrot: Seeded May 28; up June 16; roots of fair size, some seed stalks.

Golden Ball turnip: Seeded May 28; up June 5; August 1, large enough for use. A medium early, yellow-skinned, yellow-fleshed variety, 3 to 6 inches in diameter, and of most excellent quality.

Petrowski turnip No. 19554, imported from Sweden: Seeded May 28; up June 5. A yellow-skinned, yellow-fleshed globed variety of medium size and of fair quality. It is not a good summer turnip, will probably be better in the winter. Not attacked by "worms."

Gratscheff turnip No. 19555, imported from Sweden: Seeded May 28; up June 5; July 27, large enough for table use. A flat, medium-sized, reddish-skinned, white-fleshed variety of rather poor quality. Roots badly eaten by "worms" on the under side.

Turnip from Iceland No. 19795: Seeded May 28; up June 5. A large sized ruta-baga of coarse quality and very solid; somewhat affected by "worms."

Purple Top American ruta-baga: Seeded May 28; up June 5. A rather small variety of good quality.

Thorburn Improved ruta-baga: Same as above, but somewhat larger and of good quality.

Early Alaska peas: Seeded May 25; up June 6; July 2, beginning to blossom; July 27, large enough to use. Yielded an abundant crop; bloomed until frost; 150 feet of row yielded 80 pounds of peas, and many partly formed pods on the vines when killed by frost. One of the best varieties for the interior of Alaska.

Prolific Early Market peas: Seeded May 28; up June 8; July 14, beginning to bloom. A little later than the Early Alaska, but otherwise equally as good.

Long Yellow Six Weeks bean: Seeded May 28; up June 8; July 19, blossoming; August 12, large enough for table use.

Davis Wax bean: Seeded May 28; up June 8; July 19, blossoming; August 13, large enough for table use, pods 5 to 6 inches long. Has done well for the past two seasons.

Stringless Green Pod bean: Seeded May 28; up June 8; July 19, blossoming; August 10, large enough to use.

Bean No. 11978: Seeded May 28; up June 8; July 25 in bloom; killed by frost September 6 while still blooming profusely, has a single straight stalk, some of which grew to a height of 36 inches. Produced some short pods with very small immature beans.

FIG. 1.—MANSHURY BARLEY, RAMPART STATION.

FIG. 2.—FINNISH BLACK OATS, RAMPART STATION.

Green Curled Scotch kale, Early Winningstadt cabbage, Early Jersey Wakefield cabbage, Early Flat Dutch cabbage, broccoli, Brussels sprouts, Extra Early Paris cauliflower, Henderson Snowball cauliflower, and Dwarf Champion tomato were started in hotbeds and transplanted June 14 and 15. A partial failure of the hotbed and consequently small plants, a somewhat unfavorable season and unsuitable ground caused these vegetables to do poorly this season. The kale was very good. Of the cabbage the Early Winningstadt did the best and produced a few small heads. The cauliflower just began to head. The tomatoes just began to bloom. They were given a trial because of numerous inquiries addressed to the station requesting seed. It is evident that they need unusually favorable conditions and special care to be a success.

NURSERY STOCK.

A small beginning has been made in growing both native and cultivated fruits. Some were set out in 1906 and some this season. The following report is made on their growth:

Red currant, native: 43 plants set out this season, most of which started but made poor growth.

Red raspberry, native: 43 plants set out, nearly all started and most of them made a good growth.

Strawberry, native: The original plants, numbering 14, were brought from Fairbanks and set out in the fall of 1905. They blossomed quite freely this year and bore a few knotty berries. About 150 plants were set out this season and they made quite a vigorous growth.

Red raspberry: 8 plants growing, some canes 36 inches high.

White currant: 5 plants alive, 6 to 10 inches growth.

Red currant: 4 plants, short stocky growth 4 to 6 inches.

Crab apple: 2 trees, just made a good start.

Yellow Siberian crab: 4 trees, above the graft the wood is dead; 8 to 12 inch sprouts from the root.

Yellow Transparent apple: 3 trees, top all dead, growing from the root.

Florence apple: 1 tree, a small shoot growing from the root, top dead.

Okabena apple: 3 trees, several shoots growing from the graft, one 22 inches long.

None of the above were given any winter protection whatever.

REPORT OF WORK AT COPPER CENTER STATION FOR 1907.

By C. W. H. HEIDEMAN, *Superintendent.*

CLIMATIC CONDITIONS.

To assist in a better understanding and appreciation of the conditions under which the experimental work at this station was conducted, the following notes compiled from daily observations recorded at the station are appended:

Without any attempt to be technical, the entire growing season can be summed up very briefly—unusually cold and unusually dry.

On April 15 the ground was still covered with a depth of 10 inches of snow, though by this time the trail was getting bare in spots. Wild fowl, the first harbingers of spring, began to arrive on April 23 and

the first purple anemone was found in bloom April 29. By May 1 the snow had entirely disappeared in the valley. Seeding began late in April and was completed somewhat earlier than the usual Alaskan spring permits.

About the usual number of slight frosts, not severe enough to materially injure the hardier grains and vegetables, but sufficiently severe to check or injure tender grains and vegetables, such as buckwheat, millet, beans, and potatoes, occurred at intervals during the growing season.

For the growing season, May, June, July, and August, the mean temperature was approximately 48° F., the mean maximum 58°, the mean minimum 38°, the maximum was 80° June 29, the minimum 20° May 16, while the greatest daily range was 42°.

The total precipitation was 3.18 inches, the greatest monthly rainfall 1.14 inches in June. Rain fell on 22 days. During the period called the growing season there were 58 clear days, 7 partly cloudy, and 58 cloudy.

History in the Copper Valley dates back to '98, and the "old-timer" pronounced the season as the coldest and driest since '98.

VEGETABLES.

The vegetables grown in the station garden this year were in general a grand success. Our success with cabbage and cauliflower was mainly due to the fact that the plants were started in a hotbed.

The necessary material for a hotbed was not available until April 20, when a crude frame was built from logs, chinked, filled with horse manure and soil in the usual manner, and covered with screens of cheap muslin cloth. Seeds were sown April 23, and by May 1 the seeds had germinated and were making a rapid growth. During the daytime on warm clear days the screens were removed, while on cold nights additional protection was given by covering with blankets, etc.

By June 1 the plants in hotbed were quite large and stocky and were transplanted to open ground. Of the plants set out 95 per cent grew and formed heads of commercial size.

KALE.

Dwarf Curled Scotch: Congressional seeds, planted open ground April 23; up May 10; made slow growth in May and June; fit for table use July 1. Made fine large heads by September, averaging 5 to 10 pounds. Transplanted hotbed plants made somewhat better showing, but for all purposes the field-grown kale was good enough.

KOHL-RABI.

Large White: Congressional seeds, planted open ground May 3; up May 23; and were ready for table use July 20; reached a fair size.

Transplanted hotbed plants made a better showing, were ready for table use July 15. All made good growth, were of good size, and very crisp and tender until the very last of the season.

During the summer kohl-rabi suffered slightly from frosts that did not affect cabbage and cauliflower.

CABBAGE.

Early Jersey Wakefield: Congressional seeds, planted open ground April 23; up May 11; made slow growth during May, June, and July, but very few made heads of table size. Were heading in August and September when the hard freeze came.

Transplanted hotbed plants made a splendid showing. Earliest head ready for the table August 10; all made good heads, the largest weighing just 14 pounds. This head of cabbage at the market price could have been sold at Copper Center for $2.80.

CAULIFLOWER.

Snowball: Commercial seeds, planted open ground April 23; up May 10; made slow growth during May, June, and July. About half of the plants were making small heads when killed by frost early in September; at this time they were making fine growth and promised a good crop.

Transplanted hotbed plants made slow growth during June, earliest heads fit for table use August 8; nearly all made good firm heads averaging 2 to 4 pounds, the largest head weighing 7 pounds. When the freeze-up came all were making good growth; had the season continued only a few weeks longer the yield would have been surprising.

Seeds of kale, cabbage, and cauliflower were planted in open ground and in hotbed on the same date. The transplanted plants were twice as large on June 1. These were watered only twice after transplanting in June. The field-grown plants received no irrigation except from rains.

PARSNIPS.

Hollow Crown: Congressional seeds, planted April 26; up May 20; made feeble growth during the summer; were making good growth in August and reached only fair table size.

Early Round: Congressional seeds, planted April 26; seed did not germinate.

PEAS.

Alaska: Congressional seeds, planted April 26; up May 17; in bloom June 20; ready for table use July 10; seeds ripened August 1. Yield was good and a success in every respect.

Alaska: Station grown seeds, planted April 26. Behavior about same as the preceding; no difference was noted; all were saved for seed, which all matured between July 28 and August 8.

Knott Excelsior: Congressional seeds, planted April 26; up May 17; in bloom June 25; ready for table use July 17. Seeds matured August 10.

CARROTS.

Half Long Stump Rooted Chantenay: Congressional seeds, planted April 23; up May 28; made slow growth until late in July; made fair crop of roots fit for table. Season was too short for a large yield.

Scarlet Horn: Congressional seeds. Seeds were old and were in the ground five weeks before germination.

BEETS.

Crimson Globe: Congressional seeds, planted May 3; up May 21; made fair growth during summer; fit for table use August 1. The season was too short for a large yield, but nearly all made good-sized roots for home use.

LETTUCE.

Black Seeded Simpson: Congressional seeds, planted April 23; up May 10; was ready for table use July 4. Plants reached a very large size, were crisp and tender until the freeze-up came in September. One head measured 48 inches in circumference.

PARSLEY.

Extra Curled: Congressional seeds, planted April 23. Seeds did not germinate.

ONIONS.

Yellow Danvers: Congressional seeds, planted April 23; up May 25; made but feeble growth during the summer; none reached commercial size; season too short.

LEEK.

Large White: Congressional seeds, planted April 23; up May 25; made feeble growth during the summer; none reached table size.

RADISH.

Early Scarlet Turnip: Congressional seeds, planted May 17; up May 28; ready for table June 17; crisp and tender.

White Strassburg: Congressional seeds, planted May 17; up May 28; fit for table use July 1; crisp and tender.

TURNIPS.

Gratscheff, No. 19555: Department seeds, planted April 23; up May 11; made fine growth. This variety when harvested was the firmest and best in texture and quality of all the varieties grown; roots averaged 2 pounds.

Petrowski, No. 19554: Department seeds, planted April 23; up May 11; fine growth. This is a fine early yellow turnip; was the only variety entirely free from the maggot, which was so destructive to the next variety. Average weight 2 pounds.

Red Top Strap-leaf: Congressional seeds, planted April 23; made good growth; badly infested with maggot; yield was quite large; average roots weighed 5 to 6 pounds. The largest specimen weighed 12 pounds.

RUTA-BAGA.

Iceland: Department seeds, planted April 23; up May 11; made good growth; roots averaged 3 pounds in weight; largest specimen weighed 7 pounds. A profitable variety to grow for winter use. Seeds of this and all varieties were sown as late as June 1. All matured and averaged nearly as large as the earliest plantings.

POTATOES.

Our potato seed was grown at the station in 1906 and was stored in an underground cache. When examined in spring it was found that frost had penetrated the cache and the potatoes badly frozen. They were brought up about May 1, sorted over and a few appeared to be uninjured by frost. The seed cut to single eye, was planted in the garden May 17 and in the field May 20. Sprouting and growth were slow and only about one-half were up June 25. Were slightly injured by frost July 4; in bloom July 28; and badly frosted August 1. The behavior of all the varieties—Extra Early Ohio, Freeman, and Garfield—was about the same. Our record of first "new potatoes" was August

10. On that date an examination was made of all varieties; the Garfield appeared the earliest. The plants all froze to the ground August 24, were dug September 10, with following results:

Freeman in garden yielded at rate of 200 bushels per acre; 85 per cent were of Alaska commercial size, 15 per cent small. The largest hill had 7 of commercial size.

Garfield yielded 210 bushels per acre, 81 per cent commercial size, 19 per cent small; largest hill had 10 fair-sized potatoes.

Extra Early Ohio yielded 260 bushels per acre, 77 per cent commercial size, 23 per cent small; largest hill 7 of commercial size.

The largest hill of any variety yielded 4 pounds of fair-sized tubers; the largest potato, Garfield, weighed 7 ounces. The Freeman was the smoothest and apparently the best matured of the three varieties.

The field plantings were injured to a greater extent by frost than those in garden. The yield was only about half and the tubers were smaller and less matured.

RAPE.

Dwarf Essex: Department seeds, planted May 1; up May 15; made good growth; slightly injured by frost July 4. A few plants were cut back in imitation of stock browsing; these threw out vigorous new growth, the plants averaging from 6 to 8 pounds of foliage. Rather susceptible to frost.

BEANS.

Navy: Commercial seeds, planted May 1; up June 1; all killed by frost in June.

Horse beans, unnamed: Department seeds, planted May 20; up June 1; made fair growth; slightly injured by frost in June; in bloom July 4; badly injured by frost July 4. No seeds matured.

Soy beans: Department seeds, planted May 20; up June 1; made good growth, but little injured by frosts in June and July. In bloom July 25; killed by frost August 24. No seeds matured.

QUINOA.

No. 18536: Department seeds, planted May 20; up May 31; made good growth; slightly injured by frost in June; fit for table use July 4; badly injured by frost July 4; all killed by frost August 1. No seeds matured.

No. 18537: Department seeds, planted May 20; up May 31; made good growth; slightly injured by frost in June; fit for table use July 4; badly injured by frost July 4; all killed by frost August 1. No seeds matured.

This plant appears to be closely related to or an improved variety of the common Chenopodium, or lamb's quarter, which has been scatteringly introduced throughout Alaska in baled hay from the States. Our lamb's quarter appears to be adapted to Alaskan conditions and is much used for "greens."

FIELD CROPS.

For convenience of condensation and comparison of observations on the different varieties in this report reference is made to three tracts, A, B, and C.

Tract A comprises the main area under cultivation. It is on the first bench above the Copper River. The subsoil is a coarse gravel, the top is a rather sandy or silt soil washed from the benches above, rich in humus. The land, however, is very "spotted," that is, rich in spots. When the land was cleared the brush and trees were burned and these ash piles are alternately plowed

under and then crop out on the surface. Parts of the tract have been cropped for two or more years. The land was plowed late last fall and was in fair state of cultivation. One-half of the area was fertilized by the application of 100 pounds of nitrate of soda and 50 pounds of sulphate of potassium per acre; this was harrowed in just before seeding. All experimental plats were so arranged that one-half of each was fertilized. Observations are based upon the behavior of each plat as a whole. No attempt was made to conduct a series of fertilizer tests or experiments. The idea was to obtain general results, to enrich the soil which was getting poor, and give each variety under test the same conditions.

The visible effect of the fertilizers was not very marked until along in July, when the better color, health, and vigor of the plants on the fertilized portions were plainly observed. In a rough way an estimate of the benefits of the fertilizers was obtained and with slight variation it is safe to put the increased yield at 25 per cent. This, even with the enormous cost of freighting into the interior in midwinter over two mountain ranges, proved a profitable investment.

Tract B is on a third bench above the river. The subsoil is coarse gravel and clay, and on account of its aspect is considered earlier land. Frosts that injured tender vegetables on tract A did no damage on this tract. The treatment as to fertilizers and culture was the same as tract A.

Tract C is devoted to grasses. It is very low wet land.

WHEAT.

Saskatchewan Fife: Station-grown seed, tract A, sown April 28; up May 16; made good growth during summer; in bloom July 25; a few heads matured seed August 24.

Saskatchewan Fife: Station-grown seed, tract B, sown April 27; up May 14; made good growth; in bloom July 25; a few heads matured seed August 24.

Early Riga: Station-grown seed, tract A, sown April 28; up May 16; made fair growth; in bloom July 20; all matured seed by August 20.

Early Riga: Station-grown seed, tract B, sown April 27; up May 14; made fair growth; all matured seed by August 18. A few early heads matured August 10.

Velvet Chaff: Station-grown seed, tract A, sown April 28; up May 16; made vigorous growth; in bloom July 26; only a few heads matured seed August 24.

Velvet Chaff: Station-grown seed, tract B, sown April 27; up May 14; made vigorous growth; in bloom July 25; nearly all matured seed by August 24.

Ladoga: Station-grown seed, tract A, sown April 28; up May 16; made fair growth; a few heads matured by August 24.

Ladoga: Station-grown seed, tract B, sown April 27; up May 14; made fair growth; a few heads matured by August 24.

Romanow: Seed from Baker Hot Springs, Alaska, tract A, sown April 28; up May 16; made vigorous growth; in bloom July 28. No seeds matured.

Romanow: Seed from Baker Hot Springs, Alaska, tract B, sown April 27; up May 14; made good growth; a few heads matured seeds by August 24.

Romanow: Station-grown seed, station garden. This was very immature frosted seed sown April 28; up May 16; about 60 per cent germinated; growth good; in bloom July 27; was nearly matured when killed by frost August 24. No seeds matured.

Velvet Chaff or Blue stem made the best growth, but only a few heads matured.

Early Riga made only a fair growth, but ripened uniformly and all seeds matured.

BARLEY.

Pamir No. 18922: Department seed, station garden, tract A, sown April 30; up May 15; average height, 5 inches June 1; headed out June 16; in bloom July 4; seed fully matured and harvested August 1. This variety was not injured in the least by the frosts during May, June, and July. The seeds when sown were smaller and more shriveled than any of the other varieties. The seed grown at the station was plump and heavy; earliest heads matured as early as July 24. Yielded at the rate of 66 bushels per acre.

Hanna Fall: Station-grown seed, tract A, sown April 27; up May 20; in bloom July 16; made good growth; mature and harvested August 15.

Hanna Fall: Station-grown seed, tract B, sown April 27; up May 19; in bloom July 12; ripe and harvested August 8.

Primus: Station-grown seed, tract A, sown April 27; up May 20; in bloom July 20; earliest heads matured August 20; frost of August 24 prevented ripening of the balance.

Primus: Station-grown seed, tract B, sown April 27; up May 20; in bloom July 18; nearly all matured by August 24.

Hanna: Station-grown seed, tract A, sown April 27; up May 20; in bloom July 17; ripe and harvested August 23.

Hanna: Station-grown seed, tract B, sown April 27; up May 19; in bloom July 16; all matured seed August 21.

Champion: Station-grown seed, tract A, sown April 27; up May 20; in bloom July 17; all matured August 20.

Champion: Station-grown seed, tract B, sown April 27; up May 19; in bloom July 16; all seed matured August 15.

Manshury: Station-grown seed, Tract A, sown April 27; up May 20; in bloom July 19; nearly all seed matured August 24.

Manshury: Station-grown seed, Tract B, sown April 27; up May 19; in bloom July 17; all matured August 24.

Sisolsk: Station-grown seed, Tract A, sown April 27; up May 20; in bloom July 20; nearly all seed matured August 24.

Sisolsk: Station-grown seed, Tract B, sown April 27; up May 19; in bloom July 18; nearly all seed matured August 24.

Swedish No. 19557: Department seed, Tract A, sown April 27; up May 20; in bloom July 20; nearly all seed matured August 24.

Swedish No. 19557: Department seed, Tract B, sown April 27; up May 19; in bloom July 18; all seed matured August 23.

Chevalier II: Department seed, Tract A, sown April 27; up May 20; in bloom July 20; nearly all matured seed August 24.

Chevalier II: Department seed, Tract B, sown April 27; up May 20; in bloom July 20; all seed matured August 24.

No. 10754: Department seed, Tract A, sown April 27; up May 20; in bloom July 20; nearly all seed matured August 24.

No. 10754: Department seed, Tract B, sown April 27; up May 20; in bloom July 19; all seed matured August 22.

No. 12709: Department seed, Tract A, sown April 27; up May 20; in bloom July 18; all seed matured August 23.

No. 12709: Department seed, Tract B, sown April 27; up May 19; in bloom July 17; all seed matured August 20.

Numbers 10583, 10584, 10585, 10586: Department seed, sown on Tracts A and B, sown April 27. All failed to germinate.

Pamir No. 18922, from Himalaya Mountains, was the most promising barley for future Alaska work. It is apparently not a very tall-growing variety.

Attempt was made to cross this with Champion, a strong-growing beardless variety, and seeds were obtained from this cross which will be used next season.

Champion gave most satisfactory results as to yield of straw and grain, and was next in earliness to Pamir. An estimate made from small plats showed that it yielded at the rate of 2 tons per acre of straw and grain.

OATS.

Tartar King: Station-grown seed, Tract B, sown April 28; up May 19; in bloom July 23; strong growth; a few heads matured August 24.

Burt: Station-grown seed, Tract A, sown April 30; up May 21; in bloom July 26; earliest heads matured August 18; cut for hay August 20.

Burt: Station-grown seed, Tract B, sown April 28; up May 20; in bloom July 23; nearly all matured by August 20.

Banner: Station-grown seed, Tract A, sown April 28; up May 20; in bloom July 28; only a few heads matured by August 24.

Banner: Station-grown seed, Tract B, sown April 28; up May 19; in bloom July 26; a few heads matured seed August 24.

Swedish Select: Station-grown seed, Tract A, sown April 28; up May 20; in bloom July 24; only a few heads matured August 24.

Swedish Select: Station-grown seed, Tract B, sown April 28; up May 20; in bloom July 23; a few heads matured seed August 24.

Finnish Black: Station-grown seed, Tract A, sown April 30; up May 21; in bloom July 26; earliest heads matured August 15. The entire field matured by August 20; was then cut for feed.

Finnish Black: Station-grown seed, Tract B, sown April 28; up May 19; in bloom July 23; all fully matured August 15.

No. 15857: Department seed, Tract A, sown April 30; up May 17; in bloom July 4; all matured August 15; growth rather feeble.

No. 15857: Department seed, Tract B, sown April 28; up May 16; in bloom July 2; all matured August 1. This variety made the best showing in the earlier part of the season and looked very promising. The growth was very slow, heading out when only 6 to 12 inches high. It scarcely reached a size sufficient to cut for hay.

No. 13091: Department seed, Tract A, sown April 30; up May 20; in bloom July 10; all seed matured August 22.

No. 13091: Department seed, Tract B, sown April 28; up May 17; in bloom July 8; all seed matured by August 20.

No. 10624: Department seed, Tract A, sown April 28; up May 20; in bloom July 24; only few heads matured August 24.

No. 10624: Department seed, Tract B, sown April 28; up May 20; in bloom July 23; few heads matured seed August 24.

No. 1078: Commercial seed, Tract A, sown May 1; up May 21; generally in bloom July 20; earliest heads matured August 16. The entire field was cut for hay August 18. The yield of this and all other varieties was very light, owing to cold dry growing season, and checked by repeated summer frosts; growth was very slow at all times; the color was good and plants were healthy.

BUCKWHEAT.

Silver Hull: Station-grown seed, Tract A, sown May 15; up May 25; damaged by frosts in June. All killed by frost July 4.

MILLET.

Manitoba Yellow: Department seed, Tract A, sown May 15; up June 1; made but feeble growth. All killed by frost in June.

WILD RICE.

Seeds from Minnesota, sown at various times during May and June in small lakes and ponds in the vicinity of the station. None germinated this season.

WINTER GRAINS.

Nearly 3½ acres of the station land was sown July 21, 1906, in various plats with winter grains.

Late in April, before the snow had disappeared, careful examination was made and all varieties appeared to be in fine condition. Soon after the snow disappeared it was observed that with the exception of one plat all of the varieties lost their green color, turned brown, and shriveled up. Examination showed the roots all dead.

Kharkov No. 9125 and Kharkov No. 9129 winter wheats nearly all winterkilled. Probably a hundred plants on the 3 acres survived, but made only a feeble growth and matured no seed.

Winter rye No. 11268 nearly all winterkilled; a few scattering plants matured seed.

Amber Winter rye suffered but little from winterkilling. It began heading out June 20; in bloom July 4. The plat averaged 4 feet in height. The heads did not fill well, but matured seed as early as August 15. Seed of this and No. 11268 from selected plants also from the main crop were sown at once, and at this writing (October 15) have made a fair growth and stand and are now covered with a mantle of snow.

GRASSES.

About 11 acres of the station land are devoted to grasses introduced from the States. Seedings were made in 1903–1906. With the exception of smooth brome grass (*Bromus inermis*) and wheat grass (*Agropyron tenerum*) all have winterkilled badly and have run out.

Smooth brome grass: Tract A, seeded in 1903 and 1904, barely held its own. This species started growth with the earliest native grasses about May 5; by May 15 was several inches high and made fair pasture; growth during June and July was slow, fairly vigorous in low spots. It made but little progress during the entire season and was too thin and short to cut for hay. A portion of this plat was fertilized with a top-dressing of nitrate of soda and sulphate of potash at the rate of 200 pounds per acre. The effect of the fertilizers was quite marked in the improved color and vigor, but did not increase the yield sufficiently to make it profitable to cut for hay. It afforded a fair late pasture when our pasture of native grasses was bare.

Smooth brome grass, Tract B: The behavior of this plat was similar to Tract A. It was too thin and short to cut.

Smooth brome grass, Tract C: This tract is very low, wet ground, seeded in 1906. At no time during the season did the frost leave the ground beyond a depth of 12 to 16 inches. This as well as all of the grasses on this tract winterkilled badly.

Wheat grass (*Agropyron tenerum*), Tract A: This is the most promising of all the introduced grasses at this station. There was no sign of winterkilling; the growth was healthy and vigorous. It would have made a splendid hay crop and yielded at the rate of 3,600 pounds per acre. The entire crop was saved for seed, only a part of which matured. This species is a native and is found sparingly throughout Alaska. Perfectly matured seeds of the indigenous species were secured ten days in advance of the introduced.

Wheat grass (*A. tenerum*), Tract C: This was the only variety that made a fair growth and stand on this tract. It winterkilled only to a small extent.

No seeds matured. The native form of this and an erect form of *A. pseudorepens* found on similar ground near by made strong, vigorous growth and matured seeds.

Timothy: Tract A nearly all winterkilled. Some of the seeds that had failed to germinate last year came up, made a feeble growth, and headed out at 3 to 4 inches; was not large enough to cut for hay.

Timothy: Tract C, all winterkilled.

The plat of timothy comprising the lawn of the station grounds, seeded on well-prepared ground in 1905, and which last year yielded at the rate of over 3 tons per acre, winterkilled badly, and this year was practically a failure.

Festuca elatior, *Holcus lanatus*, hassock grass, orchard grass, redtop, alfalfa, alsike clover, red and white clover on Tracts A and C, seeded in 1905 and 1906, all winterkilled; scarcely a plant survived.

The forage problem is probably the most important agricultural problem confronting the Alaskan of the interior. Experience of the past few years shows that grain hay can be raised with considerable profit and certainty, but the rancher can not always be sure of maturing his seed.

The introduced grasses at this station have all proved a failure. Timothy, the "old reliable" of the States, can not be depended on here.

During the past season considerable time was spent in exploring the vicinity of the station in search of native grasses that might assist in solving the hay problem. This search extended beyond timber line in the Mount Drum region.

Seeds of 46 species of grasses were collected and these will be thoroughly tested under farm conditions. At least half a dozen of the species are very promising as meeting the requirements of an ideal hay grass. A few years should demonstrate their fitness and ability to stand the test of adaptation to culture conditions, yield, and nutritive value. Of the most promising species, seeds have been collected in quantity sufficient for ample test.

INDIAN GARDENS.

An attempt was made to interest the natives in gardening (Pl. VII, fig. 1). The result was gratifying from a practical as well as experimental standpoint. In the employment of extra help at this station preference is always given to the natives. Much of the land clearing in the earlier years of the station was performed by natives, and experience at this station shows that they adapt themselves easily to the white man's ways. Vegetables constitute practically no part of their diet at any season of the year.

Early in the spring of 1907 the Indians of the vicinity were informed that land, tools, and seeds would be supplied to all that would plant and care for a garden. Five of them availed themselves of the opportunity and a piece of ground about 34 by 60 feet was assigned to each. The ground was in a good state of cultivation and was harrowed and smoothed ready for planting about May 1. Seeds of such vegetables as were most likely to give satisfactory results were planted. Each Indian planted his own garden under my supervision. Simple object lessons were introduced in each garden to illustrate the effects of fertilizers, thinning and thorough culture, and irrigation, each garden containing a row or two of some tender vegetable to illustrate the hardiness of the plants, and estimates of the cost of plowing, seeds, planting, watering, hoeing, thinning, harvesting, and the food as well as the commercial value of the crop were made from time to time in lectures and personal talks.

From July 1 until September the gardens supplied them with an abundance of lettuce, greens, kale, turnips, with now and then beets, radishes, cabbage, and onions, and when the freeze-up came each harvested several bags of turnips for winter use.

FIG. 1.—INDIAN CHILDREN IN SCHOOL GARDEN, GOLOVIN.

FIG. 2.—PRODUCE FROM A SETTLER'S GARDEN, LORING.

During the season they were quite generous to their unfortunate friends who had no gardens, and supplied them with vegetables. With the exception of one hoeing, which I did for them at a time when they were all at their fish camps during the salmon season, the entire work was done by the Indians. At all times there was a generous rivalry between them and they took great pride in their gardens. All have requested seeds and a garden spot for next year, and in addition to those who had gardens this year, at least as many more have applied for seeds and space. Fortunately the station has plenty of ground, and a new supply of Congressional seeds has been received, and the experiment will be continued. A few of the natives will undertake gardens at their permanent camps. Altogether the experiment has been a success.

REPORT ON LIVE-STOCK BREEDING STATION AT KODIAK.

By M. D. SNODGRASS, *Superintendent.*

On April 28, after a six weeks' journey from the States, 19 head of Galloway cattle were landed at the town of Kodiak, on Kodiak Island. These consisted of 13 cows, 5 yearling heifers, and 1 yearling bull. Later, 3 cows, a three-year-old bull, and 2 bull calves belonging to the station were brought from Wood Island. These cattle were landed on the island last year and were kept at the mission for the season. On October 28, 6 head of cows, 1 yearling heifer, 1 yearling bull, and 3 heifer calves were brought from the experiment station at Kenai, where they had been kept for the past year. Since the arrival of the herd at Kodiak 3 bull and 7 heifer calves have been dropped, making a total of 46 head at this station at the present date.

The nature of the experiment is to determine the adaptability of the Galloway cattle to the natural conditions of Alaska and to develop a general or dual purpose cow that will meet the needs of the northwest territory, both as to meat and milk production.

The Galloway cattle were chosen because of their great constitutional vigor and hardiness, and their natural adaptability to a cold and moist climate. In selecting this herd care was taken to get the best milk strain to be found in the breed in the States. The ultimate object of this undertaking is to develop and operate an experimental dairy station at Kodiak and a breeding station near by at Calsinsky Bay where cattle can be raised at a small cost and sold to the residents of this Territory at reasonable prices. In this way it is hoped that the country can be stocked with a breed of cattle adapted to the climate.

The work done this season consists of fencing with barbed wire 300 acres of pasture land near the town of Kodiak, building a shed 12 by 30 feet (Pl. I, fig. 2), digging a well, ditching swampy land in feed lots, cutting with scythe and stacking about 8 tons of native hay, cutting poles for another cattle shed, clearing ground preparatory to breaking up for crops, and laying out and staking some 8,000 acres

of land at the head of Calsinsky Bay for a permanent breeding station. The season was rather backward and unfavorable for the growth of crops and hay, but the pasture has been good and the cattle have done well. The early part of May was cold and backward, but the latter part was more favorable and the grass grew rapidly, making good pasture by June 1. The cattle were in fair condition when grass came, except the cows from Wood Island, which were very thin. All began to gain flesh rapidly and by August 1 the young stock and cows that had not calved were fat, while the cows with calves at their side were in good condition. The first frost of the season came on September 1, but the pasture was good until about October 1. Since that time the cattle have about held their own in flesh. One snowstorm of about 5 or 6 inches fell on October 23. During this storm the cows suckling calves were fed hay. On October 31, all cows with calves at side were separated from the rest of the herd, fed at night, and allowed to range during the day. All cattle will go into the winter in good condition.

All pastures inclosed consist of hill land upon which grows native bluetop, many varieties of wild flowers, and in places a low willow. The cattle eat all the plants named seemingly without choice, and there has never been the slightest ill flavor detected in the milk.

The haymaking season was favorable, and with proper equipment plenty of hay could have been secured to winter the cattle. All the hay that was put up was with scythe and rake, and carried and stacked by hand. A few days' work with team and harrow in the early spring will put some 20 or 30 acres in condition for mowing hay with a machine. Much of the best hay land near the station has been taken up by the people of Kodiak.

The conditions at Calsinsky Bay are more favorable for haymaking, and an ideal stock farm can be made there.

On the whole the prospect is very bright for the successful operation of a dairy and breeding station.

WORK AT THE C. H. FRYE RANCH, KODIAK.

Progress at the C. H. Frye ranch has been the most successful this year of any year since the work began. Efforts have been devoted to stock raising, improving the farm, and clearing and breaking more land upon which the hay crop is to be mown each year. Much of the hay land must be worked over with a harrow and drag to tear up the moss and level the land so that a mower can be run over the ground; there are many little tufts of grass grown up with moss that make the land very rough and almost impossible to cut hay with a machine.

There are about 50 acres of land now in tame grass, most of which is sown in timothy. The crop was light this year, as the season was short and cool. Timothy has been grown here successfully in former years when manure had been spread upon the land.

The principal feed to be depended upon for winter is the beach grass (*Elymus mollis*) for silage and the native bluetop for hay. Plenty of both kinds of grass grows on the ranch. Five hundred tons of silage and 80 tons of hay were put up this season for the winter feed.

The silage was put up at a cost of about $1 per ton, while the hay was more expensive to put up. The uncertain weather makes it necessary to cock and often scatter and recock the hay in order to cure it. This year, however, the haymaking season was more favorable than usual.

There are now 178 head of cattle on the ranch. Twenty-five of these are grown steers, which will be marketed next summer. Thirty-five calves were raised this year, and all are growing well. Three bulls are kept for breeding purposes. The cattle fattened by midsummer and have held their flesh well. The range consists of low-lying hill and beach land, which affords splendid pasture of native grasses.

The sheep, of which there are 124 head, are perhaps the best paying investment on the ranch. They require very little attention and but little feed the whole year round. The flock was fed but a few days during the past winter and all came through in splendid condition. The breeding flock increased over 100 per cent the past season. Lambs make good growth and are hardy and strong.

The horses kept on the ranch number 9 head at present—2 stallions and 7 mares. These are bred for spring colts. It is the intention of Mr. Rier, the superintendent, to raise horses in the future and make the ranch an all-round stock farm.

DAIRY PRACTICE AT KENAI STATION.

By P. H. Ross, B. S.

The following account gives in considerable detail descriptions of actual dairy practice as followed at the Kenai Station and describes the necessary implements and apparatus required for modern dairying. It is believed that the suggestions offered will be found applicable to Alaskan conditions generally wherever farm dairying is contemplated.[a]

The beginning of a dairy herd was made at this station by the purchase of a cow and a calf June 3, 1902. This cow was bought from the Russian priest at this place and had originally come from Kodiak. She proved a good milker for a native cow, yielding a daily average of 29 pounds the first three months after calving, and milked continuously until August of the next year. In this instance the conditions were unusually favorable, as the cow came fresh in June, with the grass at its best. She has never equaled her first year's record, as after the first time she calved in the winter. She holds the station record for quality and quantity of milk.

Two more cows, daughters of the first cow purchased, were bought in 1903, one in August and the other in October. They calved the following spring and proved to be good milkers for a short time, but lacking in persistency.

On May 13, 1906, the station received a shipment of 7 Galloways—5 cows, a heifer calf, and a bull. These cattle were purchased in Missouri, and in buying the cows preference was given those possessing dairy qualities. They are a very hardy breed, and it is hoped that their dairy qualities may be improved without any sacrifice of hardiness. All the cows have calved this winter.

CARE OF COWS.

In summer the cows are turned loose to range at will. Each evening they are driven to the stable to be milked and are kept in the lot at night, milked at 6 in the morning and again turned loose. During the greater part of the summer, when good grazing and water are near at hand, this arrangement is satisfactory, as the cows are always

[a] Some of the methods and processes are more fully described in U. S. Dept. Agr., Farmers' Buls. 63, 201, and 241, which may be obtained by application to the Secretary of Agriculture, Washington, D. C.

to be found at no great distance. But after the first frosts come they begin to stray, and it is sometimes impossible to locate them in the evening, although two of the cows carry bells. Missing a milking tends to decrease the milk yield. During the winter the cows are stabled and fed twice daily. They are turned out every morning to be watered and remain out while the stables are being cleaned. If the weather is fine they remain out all day, which in the depth of winter is of five hours' duration. During the shortest days they will drink but once a day, but require water twice a day when the days grow longer.

The plants that form the major portion of their ration in the summer are the bluetop, June grass, bunch grass, and wild pea. They seem to prefer the latter above all the others, and its value as a milk producer is above question.

In winter their feed consists almost wholly of oat hay. This plant is chosen for its quick growth, comparatively heavy yield, and its excellent feeding qualities. Since being supplied with haymaking machinery we have been successful in putting the hay up in excellent condition, and it has remained bright and clean when stored away in the hay sheds. The oats are cut while in the milk stage, at which time they are best for hay. Oat hay is a palatable feed, greedily eaten by all stock, and is neither constipating nor unduly laxative. It is not a perfectly balanced ration, and of course lacks in succulence, but as a single feed it surpasses any other produced in this latitude.

The bull is fed exactly the same as the cows and cared for in the same manner. He is allowed to run at large during the summer and has never given any trouble. This arrangement is unsatisfactory, inasmuch as the date of breeding of any of the cows can not always be ascertained; but considering the amount of labor required to care for the bull in case he should be confined and the extra feed required it is the best arrangement that can be made. The present head of the herd is a pure-bred Galloway, Henry of Lockside, 23525.

CARE OF COWS AT CALVING TIME.

As the time of parturition approaches, the cow is kept up to prevent any possibility of her straying away and calving outside. Not only is there danger of freezing, but of all domestic animals the cow is peculiarly liable to have trouble in giving birth to young and should be closely watched at such time in order to give assistance when necessary. If the cow is in good condition and it is possible to give her a box-stall to herself she will in the majority of cases require no assistance. We have been fortunate at this station, as there has not been a single case of difficult parturition to date.

Retention of the afterbirth is likely to give trouble, especially if the cow has been poorly fed. The most effective means used here to cause the expulsion of a retained afterbirth is to give the cow all the warm water she will drink and as warm as she will drink it shortly after calving. Every muscle in the cow's body is "drawn up in a knot" from pain and perhaps from cold, and the warm water seems to have the effect of relieving the tension and the afterbirth is usually expelled within a half hour. If it is longer delayed the warm water treatment is continued. Nothing could be more detrimental at such time than to allow the cow to fill up on ice-cold water. Sometimes all other measures fail and the afterbirth must be removed by hand. If allowed to remain and decompose, not only will the quantity of the milk be reduced for the whole milking period, but the cow will suffer in health. In some cases a decomposing afterbirth causes blood poisoning and death.

In two instances at this station the afterbirth was retained, necessitating its removal by hand. The method used was as follows: Such clothes were put on as could be discarded when soiled. The right arm, bared to the shoulder, was well oiled or soaped and the left hand treated in the same way. The protruding portion of the afterbirth was grasped by the left hand and the right introduced into the womb. A slight pulling, twisting motion with the left hand will enable the operator to follow the afterbirth to its fastenings on the wall of the womb. It is fastened to small button-like protuberances and must be removed from such one at a time. Of course the cow must be made fast, so that she can not move about. The operation is not difficult and does not require a great length of time, but when necessary its proper performance is of prime importance. It should be performed within 48 hours of birth, before the passages contract to normal size.

THE CALF.

The calf is allowed to remain with its mother for 2 or 3 days or until it has strength to move about easily. A cow understands the care of a new-born calf better than a man does; and a calf will get a better start if left to its mother at first than it would if removed at birth. If the cow secretes more milk than the calf will take, this is drawn at regular intervals. When the calf has gained sufficient strength it is removed from its mother and taught to drink milk. At its first lesson it is allowed to suck the fingers, which have been dipped in warm milk. Its nose is then gradually drawn into the milk pail, and if allowed to retain the fingers it will make out its meal as easily as if sucking the cow. It soon learns to associate its food with the milk pail, and after it has done so it will usually learn to drink of its

own accord. If not, a great deal of patience will be required of the feeder. Some calves will learn to drink at the first feed, while others will remain obdurate as long as two weeks.

The feed for the first two weeks is whole milk, 12 to 14 pounds per day in two feeds. At the end of that time some skim milk is added and the proportion gradually increased until skim milk comprises the whole diet. In the case of the Galloway calves this winter, as the supply of milk was deficient and it was especially desired that the calves be kept in the best of condition, they have been fed partly on whole milk throughout the entire milk-feeding period. At the age of four months the calf can live and thrive without milk, but in winter time if skim milk be abundant they are fed it till grass comes. In the summer, however, they seem to thrive as well after having reached this age without the skim milk as with it.

DAIRY EQUIPMENT.

The first dairy utensils used by the station were homemade. An 8-gallon keg with a lid and dasher served as a churn. The butter was worked in a wooden bowl with a paddle. For making small amounts of butter this equipment answers very well and is recommended to Alaska farmers who make butter for household use only and have not the means to purchase a more expensive outfit.

FIG. 1.—Barrel churn.

In the fall of 1905 a more elaborate outfit was received, consisting of a barrel churn, a butter-worker, a Babcock tester, and a supply of glassware and sulphuric acid. A small hand separator was added the following spring.

The churn (figure 1).—The churn is of the barrel type, with a capacity of 15 gallons. It is mounted upon a frame and in the process of butter making is revolved by means of a crank. This style of churn is the best of those run by hand power. With it butter can be made as quickly and as easily as with any other, and it has the added advantage of having no corners—lodging places for dirt and bacteria—which renders cleaning easier than in other types. Of course, any style churn can be made scrupulously clean if enough pains are taken, but the simpler the operation the more likely it is to be performed thoroughly.

The butter-worker (figure 2).—The worker is a V-shaped bed supported on three hinged legs; the leg at the apex being shorter than the other two, gives the bed a slope. At the apex of the worker is a casting into which is fitted a wooden lever which extends the whole length of the worker. This lever is operated by hand to bring the butter into a solid mass suitable for consumption and to incorporate the salt. The slope of the body of the worker carries away the water and buttermilk that are expelled from the butter in working. Any amount up to 15 pounds can be conveniently handled. The worker is very satisfactory on account of its simplicity. All parts that come in contact with the butter are of smooth, hard wood which is easily cleaned. When not in use the legs may be folded up against the body and the worker set out of the way.

FIG. 2.—Butter-worker.

The cream separator.—This machine is too expensive for the use of those who have but two or three cows. When the herd consists of as many as eight cows, the machine will pay for itself in a comparatively short time in the amount of cream saved by its use. It is only used to extract the cream from the milk. The dairyman who sells his milk will have no use for it.

The separator used here has a capacity of 450 pounds per hour. It does very efficient work, under favorable conditions leaving less than 0.05 of 1 per cent of fat in the skim milk.

An explanation of the principle of cream separation may not be amiss here. The separation of cream from milk by any process depends upon the difference in specific gravity between the fat and the other constituents of milk. In natural cream separation, where the milk is placed in pans, gravity acts as the separating force, and the cream, being the lightest part of the milk, rises to the top. In machine separation centrifugal force is the separating agent. A steel bowl is made to revolve many thousand times per minute, setting up centrifugal force within it. In passing through the bowl the heavier part of the milk is forced to the outside and the cream collects in the center. An outlet near the edge is provided for the skim milk and the cream

outlet opens from the center. Centrifugal force in one of these machines being so much greater than the force of gravity in natural cream separation, the separation takes place in much less time and is much more complete.

The Babcock tester.—The testing apparatus used here consists of a tester, milk bottles, cream bottles, skim-milk bottles, acid measure, pipettes, and a supply of sulphuric acid.

The tester is a horizontal wheel run by hand power. Around the outer edge of this wheel are suspended swinging pockets of tin, in which the milk bottles are set in testing. When the wheel is revolved the bottles assume a horizontal position. This wheel is inclosed in a galvanized-iron frame fitted with a tin cover.

The milk bottle is a small bottle that will hold about 1¼ ounces and has a long, slender neck. This neck is graduated from 0 to 10 per cent, each division of which reads 1 per cent. Each large division is still further divided into five subdivisions, each of which reads 0.2 per cent. The neck of the bottle holds 2 cubic centimeters of water, 2 grams. The amount of melted butter necessary to fill this space would weigh 1.8 grams, which is exactly 10 per cent of the amount of milk used in testing.

The cream bottles are graduated from 0 to 30 per cent. Owing to the variable consistency of cream, caused by the incorporation of air and the different percentages of fat in the different creams, an accurate sample of cream can not be taken by measure. The cream should be weighed by means of cream scales.

The skim-milk bottle has two necks, one to admit the milk and the other graduated to show fat percentages. The whole scale amounts to but one-half of 1 per cent and has ten subdivisions. Each subdivision reads 0.05 of 1 per cent.

The pipette is used in measuring milk for testing it. It is marked to indicate the amount of milk to be taken for a test; i. e., 17.6 cubic centimeters. About one-tenth of a cubic centimeter will adhere to the sides of the pipette, delivering into the bottle 17.5 cubic centimeters, which is the amount of milk required to make 18 grams in weight.

For measuring the acid we have a 2-quart bottle with the measure attached. By tipping the bottle this measure is filled and a stopcock empties it into the milk bottle. It is much safer and more convenient than a separate acid measure.

The acid used in milk testing is ordinary commercial sulphuric acid, but it must be of a certain density—1.82 specific gravity. The station is supplied with a large carboy of this material. It is kept stoppered with a glass stopper to prevent its weakening by the action of the atmosphere. Care must be taken that it does not come in contact with the person or clothing in handling.

Cheese-making apparatus (figure 3).—The vat is made of tin and is 30 inches long, 15 inches deep, and 16 inches wide. Beneath the vat proper and contiguous with it is a jacket 1 inch in depth to be filled with water, which prevents sudden variations in the temperature of the contents of the vat. It is fitted with a set of detachable legs, which can be folded together and placed within the vat when not in use.

A small two-burner coal-oil stove belongs to the outfit. It is very convenient and gives sufficient heat for the purpose.

An upright automatic spring cheese press is used. It is of a size and power to make a cheese up to 10 pounds in weight.

FIG. 3.—Cheese-making apparatus.

The cheese knife has a gang of blades that makes a vertical cut. The curd stirrer is a wooden instrument in the shape of a T-square.

DAIRY PRACTICE.

The dairy work for the most part has been confined to the summer months. We have no separate building in which to carry on the work, and the superintendent's quarters are not spacious enough to allow of installing the dairy machinery in the house. A shed on the north side of the house has been fitted up for the purpose and answers very well in the summer. During the winter all the dairy work that is done is carried on in the house, except the separating, which is done in the shed mentioned. In operating the separator all parts that come in contact with the milk were warmed at the kitchen range just before using. This is necessary for the best results in cold weather.

During the summer the cows having free range have ideal conditions as far as cleanliness is concerned. If by any chance the udders are soiled at milking time they are, of course, washed off, and in the handling of milk or in the manufacture of its products our ideal is scrupulous cleanliness.

Separating.—Immediately after the milk is drawn it is run through the separator, being in just the right condition at this time for best results. If the milk becomes cold the process will be much more difficult, and if it becomes cold and is warmed too suddenly a large percentage of fat is lost in the skim milk. In short, milk is in the best possible condition for separating while it still retains the animal heat.

In pouring the milk into the supply can of the separator it is run through a wire strainer to remove any particles it might contain that would clog the openings of the bowl. The separator is then started, but the milk is not allowed to run into the bowl until full speed has been attained. The machine will not do good work unless running at the proper speed. Directions as to operation accompany all separators, and following these directions carefully will usually give the best results. The proper number of revolutions is always given, and it is best for the operator to time himself by the watch until he learns by practice the proper speed. The force should be applied to the crank uniformly during its revolution and not in jerks. When the supply can is nearly empty a quart or two of tepid water is added to carry out the cream that would otherwise be left in the bowl.

The skim milk is immediately fed to the calves, as it is in a better condition to feed at this time than if allowed to grow cold. The foam that always collects on the surface of milk coming from a separator is not fed, as it is believed that it causes bloating and scours.

All parts of the separator that come in contact with the milk are of tin, except the bowl, which is steel, and all are detachable. As soon as practicable after separating they are taken apart to be washed. The advantage of washing immediately is that the milk on the surfaces of the different parts is still in liquid form and easily removed, while if allowed to stand for a while it becomes hard and dry and its removal is much more difficult. The separator is washed according to the general rules of washing all dairy utensils, which are as follows: Tepid water is used first to rinse out all milk and foam remaining. Hot water should not be used for the first rinsing, as it will cook the milk to the surface of the tinware and instead of aiding in the cleansing process will make it more difficult.

The next step is to thoroughly wash the tinware with water as warm as the hand can bear, in which an alkali washing powder has been dissolved. Brushes are furnished with the separator for cleaning its various parts, and are used because they are more cleanly than a cloth, which will leave bits of cloth and lint on the tinware.

The final step in washing is to thoroughly scald all parts with boiling water, which removes all traces of the alkali and leaves the tinware bright and clean. A clean towel is used to remove any moisture that may remain on the surface, to prevent rust.

If the tinware is free from cracks, crevices, and acute angles, as it should be, and has been washed in the manner described above, no trouble will be experienced in keeping the cream sweet as far as the cleanliness of the separator is concerned. The matter of temperature has a greater influence on the keeping qualities of milk and its products, however, than cleanliness. Some agents advocate that their

machines need cleaning but once a day (two separations). A glance at the inside of a bowl at the end of one operation will convince almost anyone that an immediate cleaning is necessary.

Care of cream.—The cream is kept in an earthen jar in a room with an average temperature of 60° F., which is an ideal temperature for ripening cream. The room in which the cream is kept is on the shaded side of the station building, and in the summer the temperature of 60° is approximately maintained naturally. The cream of each skimming is cooled before being added to the cream previously skimmed. The churning is done once a week, and when the cream has stood that length of time it is about the right stage of ripeness. As each new skimming of cream is added, the whole is well stirred to allow it to attain a uniform ripeness or acidity, which gives the delicious flavor so much relished in fresh butter. The two skimmings just preceding any churning are not included in that churning, but are kept until the following week.

Churning.—On churning day the churn and all utensils that are to be used in the making of butter are rinsed out with hot water to remove any particles of dust that may have collected since the last churning. They are then rinsed with cold water, in which condition they are used, as this prevents the butter from sticking to them. In the winter artificial coloring at the rate of 1 ounce of color to 100 pounds of butter is used. The small amount of coloring required is harmless and adds much to the attractiveness of the butter. When the cows are on grass the butter is of course naturally colored.

The churn should be one-third full, which will give butter in less time than more or less than this amount. It is turned at a speed just short of that which would set up centrifugal force. The butter usually comes in less than one-quarter of an hour. When the butter granules have attained the size of grains of wheat the buttermilk is drawn off. If churned longer than this the removal of the buttermilk becomes difficult. When the buttermilk has drained off, water equal in quantity to the amount of buttermilk, and of the same temperature or a few degrees lower, is added. The churn is swung gently back and forth for a few times and then allowed to stand for twenty minutes to permit the water to absorb the buttermilk that still remains on the butter. It is drawn off and an equal quantity of water again placed in the churn and allowed to stand for the same length of time. This water should run away clear, but if not, the washing is continued until it does.

The butter is now placed on the worker. The object of working the butter is to form it into a solid mass and to incorporate the salt, which is added in the proportion of 1 ounce of salt to the pound of butter. After the salt has been added it is set away for half an hour for the salt to dissolve. It is then reworked and the working should

cease at the point when the salt is evenly distributed. Unequal distribution of the salt causes white streaks or mottles in the butter. Just the right amount of working can be determined only by experience.

The next step is to form the butter into 1-pound prints by the use of a paddle and wooden mold. The prints are wrapped in parchment paper and set away in a cool place. The utensils used are given a thorough washing and scalding, and the operation is complete.

Cheese making.—Preparatory to making a cheese the vessels to be used are given the usual scalding. The evening's and morning's milk are used to make one cheese. After being mixed the milk is allowed to stand for two or three hours in order that it may become of uniform ripeness; then the water chamber is filled with hot water and the oil stove lighted and placed underneath the vat to raise the temperature of the milk to 82° F. At this temperature the cheese color and rennet tablets are added, in the order named. One teaspoonful of the color is used to each 8 gallons of milk, which is then well stirred to evenly distribute the color. The rennet tablets that have previously been dissolved in cold water are then added in the proportion of 1 tablet to each 8 gallons of milk, and the milk is again stirred. The contents of the vat are allowed to come to rest and are not again disturbed until coagulation takes place, which will be in from 30 to 40 minutes. A good method for testing the curd is to plunge the finger into the curd vertically and then changing it to the horizontal draw it to the surface. If the curd breaks clean across the finger it is in the desired condition for cutting.

The knife used has a gang of six blades placed at intervals of three-fourths of an inch. It cuts vertically, and the strokes are made crosswise and lengthwise of the vat; and at the beginning and end of each cut the knife is brought to the extreme edge, to avoid leaving these portions uncut, as a careless stroke would do.

The curd stirrer is next used to further break up the curd. This process is carried on very gently at first to avoid undue loss of fat, but as the curd becomes firmer more force may be applied. The stove is again brought into use and stirring is kept up to keep the curd from matting together until its temperature reaches 98°, when the contents of the vat are again allowed to come to a rest. The temperature of 98° is maintained to better facilitate the formation of lactic acid. The flavor of the cheese depends in a great measure on the length to which this development of lactic acid is allowed to go. To test its acidity a heated iron is used. A piece of curd is squeezed in the hand to expel as much whey as possible and is then pressed against the hot iron for a few seconds. When drawn away fine threads will be drawn out, and the longer these threads are the stronger the flavor of the cheese will be. A cheese of mild flavor,

desirable for home consumption, is indicated when the threads are one-half inch in length.

When the desired amount of acid has developed the whey is drawn off, one end of the vat is raised, the curd piled in that end and allowed to drain. Salt checks the development of lactic acid and also adds much to the flavor of the cheese. It is added in the proportion of 1 ounce of salt to every 3 pounds of curd. Both the salt and the curd should be weighed, as too small an amount of salt will injure the flavor, while too much will make the cheese dry and hard. The salt is worked through the curd with the hands, and when sufficiently mixed the curd is spread out to bring the temperature down to about 78°. At this temperature it will unite under pressure in a smooth, solid mass with a minimum loss of fat. If pressed at a high temperature the fat, being in a liquid state, is more likely to be pressed out.

The cheese bandage is drawn over a tin cylinder provided for the purpose and this cylinder placed within the galvanized-iron hoop, The curd is filled in and the tin cylinder removed, leaving the curd within the bandage. The hoop is placed within the press and pressure applied moderately. When the cheese has been in the press one hour it is removed, the bandage straightened, circular pieces of cheese cloth placed at each end and again put into the press and full pressure applied. By means of springs the pressure is made continuous, so as to take up the slack automatically. The cheese remains in the press for about 20 hours, is then taken out, and the sides and ends are rubbed well with salt and the cheese put away on a shelf to cure. For the first week the cheese is turned daily and the ends rubbed with salt. After that it is turned two or three times a week. The temperature of the curing room should be fairly constant, a temperature of 60° giving good results. In from four to six weeks the cheese will be ripe.

The use of the Babcock test.—Once each week a sample of each cow's milk is taken and tested for butter-fat content. The method of taking the sample and of making the test is as follows: All the milk of a single milking of each cow is taken while fresh and poured from one pail to another half a dozen times to mix the milk, as even in freshly drawn milk the greater portion of the fat will be found near the surface. Then with a pipette a sample is immediately taken from near the center of the column of milk and transferred to the milk bottle. An equal amount of sulphuric acid is added and the bottle grasped by the neck and given a twirling motion until its contents are well mixed. The action of the acid is to destroy all other parts of the milk except the fat, which it does not affect. When the acid has been added to all the samples and the contents of the same are well mixed they are placed in the tester and whirled. During this whirling the bottles assume a horizontal position, and centrifugal force acting on the con-

tents forces the lighter part, the fat, to the inside, which is the top of the bottle. When the bottles have been whirled for five minutes enough hot water is added to bring the fat well up into the necks. The water should be about 140° in temperature. The bottles are whirled again for one minute and are then read. A pair of dividers are placed on the neck of the bottle with the points exactly at the extremities of the fat column. The lower point is placed on 0 and the upper point will give the correct reading of the fat percentage.

NATURAL ADVANTAGES FOR DAIRYING.

The vicinity of Cook Inlet is unusually well supplied with good water. Small springs and streams are abundant. Well water is found at a depth of 28 feet. A dug well at the station has furnished practically an unlimited supply of water for years. The demand on the well comes in the winter, the stock in the summer being abundantly supplied from the near-by streams.

The well water is soft, seemingly devoid of all mineral matter, and its 25-foot covering of sand is an excellent preventive of organic impurities. The temperature of the water varies about 2° during the year—from 32° to 34°. Ice formed on the walls of the well in winter hardly thaws out before cold weather returns again. The advantages to the dairyman of an unlimited supply of ice-cold water during the summer months are too obvious to mention.

Another advantage is the total absence of any plant detrimental to the health of stock or causing any undesirable flavor in the milk. True, the poison parsnip is found in the swampy land of this region, but the station has lost no cows during the seven years of its existence whose death was due to eating this plant. Some years ago a cow owned by one of the residents of this place died suddenly and her death was attributed to this plant, but there is no evidence that she ate it except the fact that she died suddenly. Stock will not eat this plant unless forced to by hunger when other feed of a succulent nature is scarce. In this region the grass springs up immediately after the snow goes in the spring, and having plenty of it the stock will naturally avoid less palatable forage.

The absence of bad flavors from the milk at all times is of great importance to the dairy industry. This refers not only to the freshly drawn milk, but also to that which has been kept standing for several days, which undergoes no change except that of lactic-acid fermentation (formation of clabber milk). This acidity is desirable, as was shown under the discussion of the care of cream. During the whole time of the station's work not a single instance of bitter milk, stringy milk, bloody milk, or gassy milk, which frequently causes trouble to dairymen in the States, has been noted. These results, no doubt, are due to the practical absence of undesirable forms of bacteria, owing to the relative low temperature of our summers.

REPORTS FROM SEED DISTRIBUTION.

Persons who seek information about Alaska are recommended to read the letters published herewith. They are in a way more valuable than reports from the experiment stations, in that they record the things the people accomplish. These are only a part of the letters received on that subject. All that reach the station are not written in the same sanguine mood which characterizes most of these. Taken as a whole, the season was not favorable and many report failure, though most of the following letters report splendid successes. Then, again, the reader is recommended to study them because of the practical directions found in many. To garden successfully in Alaska requires experience, whether one gets it for himself or utilizes the experience of others. The latter plan may often save time and labor, to say nothing of disappointments. For this reason it is highly desirable that reports telling what has been done should also contain clear and concise statements of how it was done. Many reports are lacking in this particular. But they all show the possibilities of the country. From the southernmost boundary to far north of the Arctic Circle these reports tell what Alaska can produce under ordinary pioneer conditions, with very meager facilities. Seeds and labor are the two all-important factors. The men and women who are subduing the Alaskan wilderness need not be exhorted to labor; they do their share of the world's work nobly, and the garden seed will be furnished them by the experiment stations on application. The Bureau of Plant Industry of the U. S. Department of Agriculture has kindly furnished seeds to the stations for this purpose.

Fred Patching, Fortman Salmon Hatchery, Loring, Alaska, November 14, 1907.—The season was probably two weeks later than usual, but after the good weather came it made up for lost time. Burbank potatoes did well. On one piece of ground which was 88 by 52 feet we dug 2,846 pounds. Gold Coin potatoes from 4 pounds of seed harvested 81 pounds. White Mammoth potatoes from 4 pounds of seed harvested 46 pounds. Banner potatoes from 4 pounds of seed harvested 47 pounds. Early Ohio potatoes from 12 pounds of seed harvested 216 pounds. Extra Early Ohio potatoes from 4 pounds of seed harvested 11 pounds. Some kind of a disease attacked the Extra Early Ohio potatoes, which accounts for the small yield. String beans, the Early Mohawk, did well and were good yielders, but toward the last were badly attacked with rust. The beans were of good flavor. Beets, Dewings Blood Turnip beets, did extremely well, growing large and were of fine flavor. Giant Feeding sugar beets grew well, but did not grow very large. Cabbage, the Early Jersey Wakefield, did well and every plant made a hard head and was

ready to use by August 1. All Seasons cabbage is fine, but a little late. Late Flat Dutch cabbage did fine and made a large growth, some weighing as high as 21 pounds, solid heads. Some of the outside leaves were enormous, being as much as 9½ feet in circumference and 38½ inches across (Pl. VII, fig. 2). Carrots, Earliest Short Horn, did very well and came in early. Early Scarlet Horn and Danvers carrot both did well. The Improved Short White carrot yielded a very large crop. Cauliflower, Early Favorite, could not be beaten in any country, being large, crisp, and of fine flavor. Celery, Golden Yellow Self-blanching, did not do well. Cutting, or Soup, did fairly well. Celeriac, Large Smooth Prague, did not do well. Lettuce, White Summer Cabbage, did well. The Early White Self-folding lettuce was, I think, the finest I ever saw. Mushrooms did not do well. Onions, White Portugal, and parsnips, White Dutch, did well. Peas, Earliest of All, or Alaska, made good growth and yielded enormously. The American Wonder pea did very well, but did not yield so well as the former. Radishes, Scarlet Turnip and French Breakfast, did very well, and so did spinach, Improved Thick Leaved. Turnips, Extra Early White Milan, did extremely well and yielded enormously. Rutabaga, American Purple-top, did very well and grew to a large size; one measured 36 inches in circumference and weighed 21 pounds without top; another measured 38½ inches in circumference and weighed 19½ pounds. The Perfection White ruta-baga did well. Parsley, Champion Moss Curled, did fairly well. Rhubarb did extremely well, some of the stalks being over 2 feet long. Horse-radish did not do well. Strawberries did not do well; had lots of blossoms, but very few berries were formed.

The trees which you sent us did as follows: 1 Dartt apple grew 20 inches; 3 Early Strawberry apple grew from 20 to 28 inches; 3 Whitney crab apple grew from 18 to 28 inches; 3 Wealthy apple grew from 4 to 16 inches; 6 Seedling apple grew from 8 to 19 inches; 2 cherry trees died; 3 plum trees grew from 5 to 21½ inches; 3 basket willow grew 24 inches. These measurements are all for the new wood grown.

S. Stride, Haines, Alaska, November 20, 1907.—Thanks for trees and bushes sent last spring. All are alive, but the growth was not much on the apples, about 12 inches. The apple trees of 1906 did much better this year, growing 26 inches. The raspberries grew 4 feet canes, but one-half of the fruit did not ripen before frost came and destroyed it. I think if you can get a cross between the salmon berry and raspberry it will ripen here all right. My currants bore fruit and are doing well. I sent to British Columbia last spring for Dewberry bushes, but they were too long coming and died. Shall try again. My potatoes, rhubarb, carrots, and turnips did well.

Andrew Jackson, keeper Point Sherman Light station, Lynn Canal, Alaska, November 10, 1907.—The choice selection of garden seeds and the nursery stock which you kindly sent this station were duly received in excellent condition, and were planted. The apple trees made a growth of 10 to 20 inches in the season. The plum tree withered, but the balance of the trees are doing nicely. Red currants made an average growth of about 10 inches, with some fruit; the plants look well and strong. White currants took root and are doing well, but no fruit. Raspberries are doing nicely. The mint looks fine and horse-radish is doing nicely. The basket willows are growing slowly. The greater number of the hardy vegetables have done fairly well and I have found the seeds of good quality. The flower seeds did not germinate, although planted in boxes and kept in a good warm place. My greatest success has been with potatoes, and I was informed by Mr. P. J. Werlich, light-house inspector, that I had the largest potato tops that he had ever seen in Alaska. Some of these potato tops measured over 5 feet in height, so there is some reason to believe that his state-

ment is well founded. Some of the potato hills contained from 20 to 40 potatoes, weighing from 6 to 8 pounds to the hill. The largest potato weighed 1¼ pounds. The potatoes from 20 hills would more than fill a sack, and those from 3 to 4 hills would fill a good-sized water pail. But all my potatoes were not like this, for some were small and not of good shape. This was where the ground had not received the proper amount of the right kind of fertilizer. Where no fertilizer was used the potatoes were no better than last year, although this was a more favorable summer than last year. This proves that the condition of the soil is of more importance than the weather. It will be a cold summer, indeed, when potatoes fail to grow in Lynn Canal, provided the soil is in proper condition. I succeeded in getting a fairly good stand of orchard grass, also white clover, which is still green and growing at this late date. The apple trees received in the spring of 1906 were almost destroyed by the snow last winter, which stripped off all of the branches. The raspberries made a growth of new stalks from 30 to 50 inches, but there were only a few berries this summer. Red and white currants are growing slowly and are in good condition, but there is no fruit this year.

C. E. Peterson, Sentinel Island Light station, Alaska, October 26, 1907.—Our garden has done very well this last summer, considering the very wet season. We seeded cabbage, celery, cauliflower, and rhubarb indoors in boxes in early part of spring and transplanted to cold frames May 20. Transplanted to open ground June 15. I only planted Early Wakefield and Winnigstadt this year, both doing equally well. Cauliflower did not do well this year, and cabbage was late in heading and small but good and crisp. My celery did not bleach until late, probably on account of the unusually cold weather this fall. My root vegetables did well this year. Ruta-bagas were large and good. Beets and parsnips did not do well. Peas did splendidly this year in ground that had never been turned until this last spring and hardly any fertilizer. I seeded Nott Excelsior and Alaska; the latter gave the best results and very large peas and sweet. Our potatoes did better this year than any previous year since we started gardening. I planted some I had from Thomas Knudson's ranch, a large, flat potato, one of which weighed 18 ounces. My neighbor, Mr. C. Bohm, planted some potato eyes he had received from the East and they did remarkably well. We planted tomatoes; they grew large bushes, blossomed, but died out. Cucumbers did not do well. The apple seedlings you sent I set out and they grew from 15 to 26 inches. In new ground all the berry seedlings bore fruit; the red currant especially did very well. The trees I have had for two years did not grow anything to speak of this year, but the last you sent started to grow as soon as I planted them and carried large leaves. Maggots destroyed the horseradish. Willows growing slowly. Our rhubarb did very well the second year's growth.

T. H. Jarmy, Comet, Alaska, October 1, 1907.—All of the garden seeds have done well, but I was late in preparing some of the ground for the seed; so, of course, our cabbage has not had time to head well, nor the tomatoes time to mature, but I am satisfied that they will grow here if they are transplanted early enough. I mean to give them a good chance next year. I have a good spot for a garden; it is sheltered from all winds and the sun has a clear sweep at it all day long. I wish you could see our rhubarb; it is fine. All of the plants have done well except the tomatoes and cabbage plants, but this was our fault and not the fault of the tomato or cabbage seed, or of the climate. We have a nice little orchard from the trees which you sent to us; every tree is growing nicely, except the plum tree, and one of the willows died. We shall be glad to receive any further plants for experiment from you next spring and shall greatly appreciate anything you may have for free distribution.

A. Lawson, Sunrise, November 1, 1907.—I thank you very much for the seeds you sent me. My gardening operations have been on a rather limited scale this season, owing to a very poor market and unfavorable weather. Potatoes grew poorly and are very watery on account of incessant rains and lack of sunshine. I did not raise any cabbage or cauliflower this season because my ground is infested with cutworms to such an extent that last year's crop was almost a failure. Beets, turnips, onions, and ruta-bagas turned out fairly well. Lettuce, radish, rhubarb, parsley, spinach, Swiss chard, pepper grass, mustard, etc., have always been a success with me regardless of weather conditions. I sowed some wheat May 18. It grew very nicely, headed out and bloomed, but could not progress further, it seemed; so after the killing frost it was cut down for green fodder. I sowed oats on some spare ground June 23 and they grew luxuriantly, heading out when the frost came. It made a very heavy yield of green feed. Apple trees and berry bushes growing nicely.

Alex Fricdolin, Afognak, Alaska, November 10, 1907.—With seeds you have sent me I had the usual success, with the exception of flowers and cabbage (Early Jersey Wakefield), seeds of which were old and failed to produce plants. Oats (common), barley (Minnesota No. 6), millet (Siberian), were sown on May 11. The barley grew fine and all seeds ripened; the oats also grew fine, but only 80 per cent of seeds matured. The straw of barley was a little green yet, as was the straw of oats at time of cutting, October 28. The millet came up, but grew only to a height of 1 inch during the season. A new sort (at least here) of ruta-baga has been grown here for the past two seasons. Seeds were imported from Sweden by Mr. H. V. Scheele. It is of a cylindrical form, yellowish flesh, and of a good winter keeping quality. The currant and raspberry bushes are growing satisfactorily, but have not shown any flowers yet. The apple trees sent by you formerly are growing very slowly, but the later ones, which were much bigger, are growing remarkably well. The plum (3 trees) started to grow satisfactorily; the cherry (2 trees) are growing rather poorly. The Dartt crab apple is growing, but the Beecher sweet, having hardly any roots at time of planting, has died, as I expected. The basket willows are happy over their new home.

Henry S. Tibbey, Coal Harbor, Unga Island, June 28, 1907.—By last *Dora* arriving here on June 26, I again became your most willing debtor for a variety of nursery plants, viz, 3 crab apple, 1 Dartt apple, 3 Wealthy, 3 Early Strawberry, 1 Beecher sweet apple, 2 plums, 2 cherry, 4 red currant, 6 white currant, 6 raspberry, 1 horse-radish, and 3 unknown. Those coming to me last year, save one, an apple, all perished during last winter and from no lack of care upon my part. Heretofore it has been my custom to set them out in the open directly from the mail package, which I believe to be a mistake. With this last lot I have carefully potted each one in selected soil and will care for them indoors till next spring, when they will be set out. One of the red currants sent here two years ago is in bearing this year and stands over 3 feet in height; another promises to follow suit next year. A small clearing in an alder patch has proved to be the warmest and most sheltered spot for tender nursery plants, and from most selfish motives I shall do my best to rear to maturity in such locations the last lot you sent us. An increasing interest seems to be growing among the native element in caring for cattle, making butter for sale, for home use, and depending less on the store and more and more on the products of the family cows for supporting and rearing their children.

August 31, 1907, suggested by the reading of Bulletin No. 3, entitled "Haymaking at Kenai Experiment Station," it occurred that my own experience, covering a period of two decades and confined exclusively to the curing of

native grasses at this place, might prove also instructive to those pioneers who are brave enough to face the agricultural problem in Alaska. At first my efforts were limited to a quantity sufficient to supply a working horse the year round and afterwards to include a small herd of cattle, from three to seven in number. A scythe and stone, a hand rake, and pitchforks for two men constituted our working implements and force. By cutting the grass, mostly bluetop, immediately after the seed had fallen, a crop was also assured for the next year and succeeding years from off the same ground; an earlier cutting would result in a fine crop of weeds for the next year, but no grass. To dry the native hay on the field overmuch and store in the barn causes it to pulverize and become smoky, the animals meanwhile coughing while eating it. The boiled-down essence of my experience in hay curing has resulted in proceeding as follows: One man cuts, another following closely spreads with pitchfork until as much is laid as can be worked quickly and made ready to haul in on next afternoon. After spreading turn, and when reasonably dry rake it into windrows, then gather with a hand rake into cocks and finally stack. Now it is sufficiently cured to make the best hay, improved perhaps by occasionally sprinkling a few handfuls of half-cracked salt as it is being filled into the barn and trampled down, on the afternoon of the next day after cutting. Should rain, however, occur after stacking, before hauling, the whole curing process must be repeated. By following this plan we have never failed to secure a crop of hay and of the best keeping quality. The winds that we depend upon for successful hay making are those from the northwest, which invariably mean clear, dry, and sunny weather with us. Winds from the southwest are always accompanied with squally, showery weather. One must avoid cutting more at a time than can be taken care of. To leave grass exposed to the wet weather for even a few days robs it of its nutritious properties.

I. S. Williams, Montauk Point, Eagle, Alaska, October 15, 1907.—The seeds you sent me last year have been tried with fair success. The cabbage did not do well. I believe the soil was not suited for it. Lettuce, radishes, and carrots of any kind grow as well as in any country. Scarlet Horn is really the best carrot. Parsnips and beets did fairly well. Potatoes about eightfold. They, as well as everything else, seem to grow better as the ground gets worked well with manure. My flowers did not do very well, probably due to late planting. Ruta-bagas and turnips grow fine. I am well pleased with the results, but expect to do still better next season, as I am learning. I thank you very much for the seeds received for next year.

R. C. Mitchell, Chicken, Alaska.—I will submit a report of what I have done. My notes will be brief, as I am situated so as to handle and care for only what seeds seem best suited to my immediate use. The hardier vegetables and plants seem to do well. Ruta-baga, beets, turnips, potatoes will not mature, though one can have plenty for home use. Carrots, kale, cress, cabbage, rhubarb, all give promise of moderate success. I had only new ground, but have a good garden spot for next season. I have no plow and only one horse. I cut and saved 60 tons wild hay in good condition. I am devoting most of my energy to trying timothy. Will give you report on nursery plants. Received the following plants June 25: 2 Whitney, 1 Early Strawberry, 1 Plum seedling, 3 Wealthy, 2 Crab apple, 6 currant plants, 4 white currants, 6 red raspberries. All are doing very nice except 3 raspberries and 1 currant, which are dead. The best growth wood, 12-inch sprouts, on the Whitney tree. Received the following September 25, all dry and dead: 4 small plants Iowa Beauty, 2 large plants Iowa Beauty, 2 large plants Whitney, and 2 seedling plums. The Eagle post-office is much crowded and likely these latter plants were stored with other mail for the summer. This is a high basin, close to 15 by 20 miles

in area, with low lying hills surrounding, which permits of a good sunshine, even in the shortest winter days. The soil is deep and rich, of a sandy loam or of decayed vegetable matter—probably an old lake bed. In future I hope to be fixed so as to give a thorough test to grains and will give my best care to all nursery stock. Thanking you for past favors.

A. H. Monroe, Rampart, Alaska, June 21, 1907.—I received the trees that you sent me and immediately planted them out in as good soil as there is here. Here is a list of the trees: 1 Martha crab, 1 Dartt crab, 4 Siberian crab, 4 Orange crab, 6 Seedling plum, 3 crab apples, 3 white currants, 7 red raspberries, 2 horse-radish—30 plants in all. The plants were in two packages and seemed to be in very good condition. They were sprouted some, but I think that by good care they will make a good growth this year. Of course we do not know if they will be able to withstand the low temperature of this country or not. We can only try. The rhubarb that was planted on this same ground lived through the winter. I have two seedling apple trees which came up this spring and which seem to grow fast. I shall watch these trees with much interest. This country appears to be the natural home of the red raspberry, for in some places there are large areas covered with them, and last year everyone who would take time got all he wanted to put up for the winter. The red currant is also very plentiful in places. As the spring was ten days earlier this year than usual the gardens are also earlier, and as there has been no lack of rain everything has been growing fine. I have not been over to the experiment station. I do not know how things are over there, but from this side of the river it looks as though the men are making good progress in the way of clearing off the ground, also the grain shows up very nicely from here. I believe there are more gardens planted in this camp this year than in any previous year. This is caused by the need of the miner, who now knows by observation that vegetables will grow here. Very few seeds are wasted, for if the one receiving them can not plant them he finds some one else who can. Thanking you again for the seeds and the trees.

Henry Butke, Chena, Alaska, October 15, 1906.—I wish to report the result of the seed that was sent me. Brussels sprouts, cabbage kale, carrots, and rutabaga all did very well; in fact, I never saw any better out in the States. Parsley, onions, and celery did not do very well. I planted turnips, potatoes, and string beans, some seed that I had, and they were extra fine. In fact, the only stuff that did not do well were onions, parsley, and celery. I hope you will send the nursery stock as early as possible, so I can get them set to get an early start.

W. Weurich, Chena, Alaska, September 15, 1907.—My ground is high and sandy, and lies along Tanana River. Small plants when set out were watered by means of an inexpensive water wheel, described below, which raises the water from the Tanana River. Part of the ground, about 8 acres, was broken this year, part three and four years ago. None of the ground, except one small patch, was fertilized with any other fertilzer than fish (salmon), decomposed the year before. Only part of the soil was thus fertilized, and the difference between the fertilized and nonfertilized vegetables amounts to 400 or 500 per cent. The late cabbage fertilized made heads weighing from 5 to 10 pounds, while those which were not fertilized did not head at all. We used one-half a fish between two hills of cabbage; that is, one fish, or the amount of decomposed matter corresponding, served for four hills of plants. The fish were dog salmon, which ran in the river by the thousands and thousands, and are only used by those who wish to dry them for dog feed. On March 29 (temperature 29° F. below at night, 10° above in the daytime, cloudy, cold, and windy), celery was planted in boxes in house (not light enough); did not set out, too spindling.

Seeded cabbage (Early Winningstadt) in hotbed made as follows: Glass top, sides and ends of logs 2 feet high, well mossed. Under entire length of bottom runs a 6-inch pipe carrying smoke and heat from a stove sunk below the level of bottom of bed at one end. There are three or four ventilators running from below, where stove heat rises up into hotbed, which is glass covered; thus the sun shines in and heat comes up from below, making it very warm. On April 13 sowed Early Winningstadt cabbage; came up April 16; planted out June 10; some headed September 10; very hard, fine heads, 4 to 6 pounds; an excellent keeper. Salzer Lightning, planted April 12; up April 16; set out June 1; commenced to head August 1. This is a successful early cabbage, but three or four days behind Early Jersey Wakefield, planted at the same time and under same conditions. We planted a bed to 10,000, which caught fire from the stove at end and burned out. This was all late cabbage. April 25, planted a number of late cabbage, including Premium Late and Flat Dutch. It was heading September 15, but should have been 10 days earlier, as we intended, had bed not burned. Many heads will go 10 pounds and more. Was fertilized with fish. That part of the field which was not fertilized will not make any heads worth speaking of. We decided to plant out the fall crop of cabbage—that is, late varieties—as early as possible before June 5–10, just as early as our earliest cabbage. Any cabbage that we plant after June 10 will be an early variety, which will mature before frost. Seeded cauliflower April 13. Early Snowball set out June 7–10, some 14–15; first pulled July 17, 10 days earlier than cabbage. Most of crop gone by September 7, only a few stray heads to be found September 15. It all headed out, but heads would scarcely average 1 pound. As it brings only a few cents a pound on market more than cabbage and weighs one-fourth as much as cabbage per head, with exactly the same expense for culture, it does not pay to raise it; that is, when you can sell all the cabbage you can raise on the same ground. Seeded celery April 13, in hotbed as above; set out in hotbed June 8–12; no fire under beds now, as fire is out and weather warm. Owing to the fact that this bed had very little horse manure the celery did not grow as luxuriantly as it should, but when bleached was of excellent flavor. That grown in about 1 foot of manure mixed with the same amount of sandy soils stands nearly 3 feet high. Used celery seeded April 13 on September 10. White Plume variety excellent flavor and quality. Brussels sprouts do not do well enough to pay, though there are many small heads on stalks. People will not pay a price to warrant raising them for market. Cucumbers planted out in hotbed April 12 were up April 16, and set out 6 inches high in hotbed June 10, 2 feet apart. As these were not covered with glass during summer they did not do well, though when covered and watched they do well. Tomatoes, a few seeds planted April 12, in hotbed, treated as cucumbers did nothing; should have been covered with glass and cut back. Planted potatoes May 19, home-grown seed, Early Rose and 56 pounds of a white variety, also home-grown. Soil broken up with plow April 16; double harrowed; laid off into rows with single shovel and planted shallow, 1 foot apart. The soil is sandy, but was not fertilized at all. Potatoes yielding about 12 for 1. If the difference is as great for potatoes as cabbages, fish fertilizer will make potatoes go 50 pounds for 1. I do not think that they will go less than 30 to 40 for 1 if they are properly fertilized. Potatoes came up June 12, and many were the size of a hen's egg by July 25. Tops froze lightly September 1; killed about September 7. This could have been prevented by a few fires for a night or two. Last year we prevented injury to potatoes until September 20. Planted carrots May 21 on best fertilized land on place with horse manure and fish for fertilizer two years ago; did well, mostly pulled September 10. Carrots are hard to raise in here except on best

of fertilized land. Parsnips raised with like culture and conditions were not a success. Will plant no more for market. Peas, American Wonder and home-grown seed of Alaska pea did well; Alaska pea two or three days earlier. On June 14, planted about 40 pounds potatoes, poor seed, ground poor, no fertilizer, but September 10 many potatoes would do to use. June 14 is too late for a crop to pay. All sorts of lettuce and greens, turnips, radishes, etc., grow according to the amount of fertilizer put on the ground, but are nearly always crisp and tender. Our goods are raised to pay, and of course we have tons of cabbage, turnips, ruta-bagas, potatoes, etc., but it will be little ground that we attempt to cultivate without fertilizing.

Market gardening is of course an assured success in the Tanana Valley, for there are a dozen or more men who not only eke out an ordinary living but make money at the business by employing labor of five or six men, or more, to the ranch. This country, like most of Alaska (interior), is dry at certain times of the year. This difficulty we have overcome by using an irrigation wheel, turned by the current in the Tanana River. It has four wooden buckets 5 feet long and 12 by 18 inches deep attached to long arms which raise the water about 10 feet above the bank. The water runs into troughs and off to the bank where it is carried by troughs all over the place. This gives us plenty of water at all times for setting out plants and irrigating afterwards when necessary. The wheel throws from 50,000 to 100,000 gallons per day, depending upon the current, which varies as the water rises or falls. Such a wheel would, I think, prove satisfactory on the low benches along the Copper River. This wheel cost about $100, most of which was for labor, as there is only 150 feet of lumber, the arms being poles from the timber, also the axle and raft logs, which support it in the water. I could give a more complete description to any inquirers, but it is an old idea and probably many can construct a better wheel than ours. To outsiders who hear of the prices that we obtain for our goods I would say that it is all right to put in the back end of a small lot for family use, but as a business it takes a few thousand dollars and at least two years' time to do anything at all; meanwhile those who are in the business will have gone so far that competition will be felt most bitterly, to say the least. I think it easier to buy a farm than to make one up here. Fruit trees which you sent this summer are doing well.

Mrs. Emma Pease, Fairbanks, Alaska, July 9, 1907.—I have just received the currant bushes, also the trees, and all are doing nicely. My garden is in good condition and I will have green peas to eat in a few days. The vines are in splendid condition and stand 3 feet high and are well filled with peas. I have had turnips to eat and beet greens, also radishes. I had two beds of radishes. The asparagus did not grow, and I think it was frozen. It did not come up. I planted everything on May 4. We had two heavy frosts, May 9 and May 11, and a heavy snowstorm on May 12, but it did not harm anything. The apple trees are growing nicely, as well as is everything else in the garden.

S. F. Shepard, Mary Island, Ketchikan, November 30, 1907.—I am pleased to report a good garden this year. I planted nothing but lettuce and radishes before the middle of May. All seeds went into the ground about that time. Lettuce and radishes could be grown here by the ton without trouble. We began using [illegible] June 1. Ruta-bagas and turnips grew well; some of them weighed 8 and 9 pounds. Transplanted cabbage June 10. They grew large and small, but made good solid heads, some few weighing 12 pounds each. Potatoes did not grow overly large, but were what might be called a fair size. Parsnips and carrots large. Began to use green peas and new potatoes the first of July. Beets averaged in size about 3 inches in diameter. I succeeded in raising

good cucumbers, 2½ to 3 inches in diameter and plenty of them. A good way to treat cucumber vines in this part of the country is to keep most of the blossoms picked off and after the vines make a growth of 3 or 4 feet nip the end. I gathered 100 pounds of rhubarb from 15 plants this year. The currant bushes received from your station this year made a good start, also the apple trees. The plum and cherry trees both failed to grow. Siberian crab and Florence set out last spring are growing well; they are about 4 feet high. Have a fine red-raspberry patch. Next season I expect to have more berries than I can use. All free-flowering annuals do well here, as do pansies and pinks of all kinds. The ground, or soil, is improved by working. All it seems to need is frequent turning. I expect to have a better garden next year, although I am satisfied with this season's results.

F. N. Kreuz, Fairbanks, November 4, 1907.—This in reply to your request that I report results of my efforts at gardening at Fairbanks. My place is 36 by 50 feet. The soil was only 6 inches deep, so I wheeled some soil from the road to a depth of 1½ feet, and had about 3 inches of wood ashes and 4 inches of old horse manure mixed with it and tamped so the soil was raised 1½ feet above the ground. I planted two boxes with Wakefield cabbage, kept them in the cabin, and transplanted May 15. They did not grow much for the first two weeks. A big "worm" was eating the leaves off the stem. I had to keep transplanting them again until finally I had the worms destroyed. It grew profusely in dark rich healthy colors at all times. On June 15 it commenced to head up. Planted them 18 inches by 3 feet apart in rows. On September 15, when cut, from 10 to 15 heads weighed 15 pounds apiece, all good solid food for cooking; the smallest weighed 7 pounds; 50 heads in all. It was the best I have seen anywhere around town. Ruta-baga, Purple-top American, planted in garden May 12, did not look well; leaves full of little holes; insects must have been the cause. Thinned them out June 12 and transplanted some afterwards, which grew nicely. I would like to ask, if not too late, for another collection of your seeds for next year's planting. All the seeds from your station seem to be better than those bought here.

H. Buzby, Fairbanks, December 9, 1907.—On June 23, 1907, I received from the Sitka Experiment Station 2 red currants, 2 white currants, and 6 red raspberry roots. On June 30 I received from the same station 2 Whitney, 2 Duchess, 1 Strawberry apple tree, and 1 seedling plum tree. They had been on the road about 30 days and had all made from 4 to 8 inches of growth while packed. I placed them in a good location in good ground. The growth on the currant and raspberries died down, but a second growth started the last part of July. The plum and apple trees kept on growing and went into the winter in good shape. Snow fell October 10 and 15 to the depth of 15 inches. The winter has been very fine up to this date and I think the trees will winter all right. Will report next summer. Our vegetable crop last season was fine. I sowed a small plat of Macaroni wheat and Silver King barley on May 10. The barley was fine and fit to cut for seed August 10. The wheat made a good growth and filled well and was in the hard dough when I cut it August 25. Last season was a little cool here, but no frost after the spring frosts were over until September 1. There were great quantities of farm produce raised in this part of the Tanana Valley. The only question now is to bring the soil to as high a state of cultivation as possible and plant the very best seed and plant early. I planted potatoes April 29. They had been started in the greenhouse and had sprouts well developed; those potatoes were the best we had. We planted at intervals until June 1. Of all the root crops the first plantings were the best in every instance. We planted all our peas the last part of April; the crop was excellent; some of the late varieties made a growth of 7½ feet

and were loaded with fine peas. We planted Alaska, Early Prolific, Gradus, Centennial, Horsford Market Garden, Champion of England, and some field peas, and had peas from July 15 to September 10. We sold cauliflower (Maule Prize Early) July 22, cabbage (Estampes) same date, carrots July 24, turnips June 26, beets June 25, all from plantings made outdoors. Our rhubarb (Victoria), from yearling roots, transplanted last spring was fine. We raised onions (Silver Skin) from the seed that made good marketable onions and ripened nicely. Have some in the cellar at this time; are perfectly firm. There will be several acres of potatoes planted in and near Fairbanks next season.

J. F. Karshner, Hot Springs, Alaska, November 15, 1907.—I drop you a partial report of crops. The wheat will be first on the list. The crop was fine and did well. I put it out on a strip of ground that was handy for an experiment, to see the difference on poor ground and on rich ground—a clay ridge and a ravine or low piece of ground very rich. The clay ridge was the best, as the grain ripened about August 20, was very regular, and stood up better and bore very fine heads, stood about 3 feet high. The richer ground did not ripen as early and a storm laid the grain partly down. It was at least 1 foot taller than that sown on poorer ground and was at least one week later in getting ripe and the heads were no larger than the former. Birds, a sort of sparrow, got to bothering the wheat quite early before it was ripe and continued to eat it till the wheat was cut. The first I have observed of the kind on wheat. I shot a few, but they came in large numbers. Potatoes were a good crop. Early Rose, Early Ohio, Late Rose, Garnet Chilli yielded about 350 bushels to the acre; White Elephant, Burbank, and Snowflake about 250 bushels. We had about 100 tons of potatoes this season. Cabbage was not a full crop. Peas and Golden wax beans did well. Cucumbers only partial crop. Other crops only partial on account of late planting and indifferent handling (Pl. II, fig. 2). Tomatoes did not ripen as the year before. I will put out 30 acres or more of potatoes next season and other crops according as we shall have the ground in shape and more teams. Putting crops in early seems to be what is needed to get good results, and getting ground in shape the fall before by pulling all stumps, hauling manures, etc., on the ground. Our chicken ranch is a great feature. The hot ground makes an ideal place for the business. Will you send me a pamphlet on putting up a silo and treating silage? Our silo was a failure for this year, so please send me some publication on that.

Joseph T. Braxton, Tanana Crossing, Alaska, February 4, 1907.—I take pleasure in saying that the seed you have sent have always been highly appreciated. I had a garden, about 2 acres, in vegetables last year. I had lots of turnips that would weigh 8 pounds each; parsnips and carrots that were fine. My cabbage I did not weigh, but I had some nice heads. The peas were fine; rhubarb—I never saw any better. We have a very nice climate here. If I could get a market for my vegetables I should make money. I have been trying to get some cattle here. I am sure they would do well. I had five horses that wintered out all last winter and there are three here this winter that have not been fed any as yet. I have been in the Fortymile country freighting since November, 1906. We have miles of bluetop grass from 3 to 4 feet high. In summer we could cut tons of it. If the Government is going to bring in any cattle, or sheep, I think this would be a nice place to put them. In this valley I have been greatly handicapped by not having a plow, but I have a plow now and I can break up some land for tame hay. I forgot to speak of the oats I planted last year. Some of them got ripe and headed out fine. I am always glad to hear from the Agricultural Department. I will assure you I will keep a better account of my vegetables in the future.

C. A. Fowler, Kuskokwim River, Alaska, February 2, 1907.—I planted the seed sent here by the experiment station and can say that most of it turned out very successfully, in fact all but peas; they were planted on the first of June and came up in about five days and grew nicely for three weeks and then seemed to stop for nearly a month. They then took another very thrifty start and grew luxuriantly for the rest of the season, but did not produce anything at all. Potatoes, turnips, radishes, cabbage, kale, ruta-bagas, and lettuce did just as well as at any place I ever saw. All seeds were planted in a sandy loam or a sedimentary deposit of the river. I see by the report of last year that cattle are being tried as an experiment. Now I wish to state that if there is any place in Alaska that cattle will be successful it is in the Kuskokwim Valley. There is an abundance of feed here; the blue joint grass grows here equal to any place on the globe and the summers are quite dry. There has been no time in the last four years that hay could not have been cured outside and the winters are not as long as they are farther north. We do not have over 12 or 18 inches of snowfall on the level at any time; then there is a thaw that cuts it down to the ground, which would be of great benefit in raising cattle. There is scarcely any time during the winter that cattle or horses could not be out browsing or grazing; that is, if they have sheds to go into at will, the same as in the northern part of Canada.

Rev. Adolph Stecker, Superintendent Moravian Mission, Bethel, Alaska, November 12, 1907.—In a few days the first winter mail will leave Bethel, and as it is the first mail since we have harvested our vegetables, I will give you a report of the result of our gardening. I am sorry to say that we had a very poor harvest, and no doubt so it has been all over this part of Alaska. We planted everything in the usual time from May 20 to the middle of June, but with the exception of a few dry clear days in a month it has been stormy all summer, southern storms prevailing. On account of having so little dry, clear weather everything has been held back. Potatoes yielded not half as much as last year. Cabbage had only very small heads. The cabbage plants were more than half destroyed by "worms," although we have not seen many butterflies this year, and although we have put lime mixed with ashes around all the plants. Ruta-bagas, carrots, and turnips were small. Even the flowers which grew other years in such wonderful profusion have not been so full nor so many, although we had some in our flower beds. The garden on the island in front of our station was last summer a failure. In spring the water was very high, soaking the ground and later the constant rain would not let the ground dry out enough. Yet I worked it and planted it, and after I had planted it, the very same day we had such a high tide that the whole island, and of course also the garden, was 1 foot under water. Several times afterwards the water became so high that it filled the furrows, yet I believe it is splendid soil. The young trees I received and planted June 21. They have grown very nicely. When it began to freeze in the beginning of October they were all alive with the exception of two small ones. The larger ones have beautiful green healthy leaves. After the ground was well frozen I covered the land around them with grass and we hope to winter them well. A number of white people, who went up the river, asked for seed and I distributed those which had come last year, for which they were very glad. Thanking you for the seed and trees received, I hope to be able to give a more encouraging report next year.

Jos. Perron, S. J., Holy Cross Mission, Koserefsky P. O., October 15, 1907.—I have the honor to report that we could save only four of the apple trees you sent us last year, but these four and the trees sent us this spring are doing very nicely. The currant bushes are doing well, but not so the raspberries. We had an unprecedented summer, very cold and almost continual rain and

only about six days of sun. We had a splendid spring for planting, yet on ac count of the summer our potatoes did not show up in number and quality as in former years, yielding this season only 500 bushels, while the average yield in the past was about 900 bushels. Carrots were fine, never better in size and quality. We had four beds 50 feet long and 4 feet wide. Beets gave good satisfaction, especially those we transplanted. The Purple-top turnips were the best among those raised, and the early variety of cabbage did well, but the late variety headed up small. Ruta-bagas did not do well. There were four beds of parsnips and they were fine. Radishes, celery, and salsify did moderately well, but the lettuce surpassed that of any previous year and headed so large and full as to resemble cabbage. We planted oats as usual, but we cut it for forage, as it never matures. On August 15 we sowed wheat and rye, and it attained a growth of 3 inches before the frost came. We hope to be able to give you a good account of this experiment next year. We have 12 acres of plowed ground and, all told, about 50 acres under cultivation, which supplies us with good hay for the cattle. We have 3 horses and 13 head of cattle, all doing well and kept in good condition on hay made in the country. Last winter (1906) we butchered a young bull weighing 800 pounds and the meat was excellent. We have three others, which will be fattened and killed later on. The yield of milk this summer was not as great as in former years, owing to the number of mosquitoes, the cattle not wishing to go far from the place. A fact hardly credible, nevertheless true, is that one of our cows last year gave 9 gallons of milk daily for a week, then 7 gallons for three weeks, then 6 gallons every day for a long period of time. The milk is very good and rich and we have made a good amount of very excellent butter and cheese. We have added a shingle mill and planer to our sawmill and use only shingles made in the country to cover the new buildings. I beg you to send as soon as possible the seeds requested. I think it would be well to have some arrangement with the Post-Office Department whereby the seed for places in Alaska could be forwarded quickly.

W. H. Snyder, Council, Alaska, December 5, 1906.—I have had a garden here for the last four years that has been a success. Radishes, turnips, beets, and all early vegetables do well. Had one hill of potatoes that yielded 6 pounds of nice potatoes. I have blue grass growing; it does well. We have fine soil. I think wheat, oats, and barley can be grown for hay.

Judge C. W. Thornton, Nome, Alaska, November 19, 1907.—I hereby report to you my success and partial failures with plants, trees, and seeds received from your station: First, apple trees; these, with currant and raspberry bushes, arrived in July. They had evidently been on the way for some time and did not appear to be in the best of condition. However, they were carefully planted and given attention and appeared to be doing well up to the latter part of August, when we had several cold storms, which seemed to blight and wither them and from which they seemed never to recover. The final freeze up came about the first of October, and these trees and bushes seem now to be dead. With vegetables I have a very different story to tell, having had wonderful success with some, particularly radishes, lettuce, turnips, and spinach. In fact, I beg to venture the assertion that no better radishes and turnips can be grown any place in the world than right here in Nome. I raised three crops of radishes on one patch of ground and some of the first crop, left in until the close of the season, attained a growth of nearly 2 inches in diameter, and were still as crisp and tender as any radishes I ever ate. Immediately adjoining us Henry Kuehne guarded and tended one of his earliest and largest turnips and at the close of the season it measured over 22 inches in circumference and weighed a little over 4 pounds.

Frank E. Howard, United States Commissioner, Coldfoot, Alaska, September, 1907.—As it is probably too late to forward matter from this remote place to reach you in time for your annual report, I will only give a brief statement of the result of my operations for the summer of 1907, accompanied by a few pictures of some vegetables I raised. The pictures are not first class, but I think they are plain enough to give you a fair idea of what can be done in gardening this far north; at least they will give a clearer idea than word picturing. My whole garden was unusually successful during the season of 1907. The reason for such was a prolonged period of clear warm days and nights, I could say a period of continuous day with almost continuous sunshine during June and July, with no cloudy weather and frosty nights, which conditions gave all plants an early and vigorous start. During the period I sprinkled and irrigated quite often. I transplanted cucumbers to open garden (vines started in boxes in the house) the first week in June. The cucumber bed was raised several inches above the general surface of the ground, with board inclosure raised 6 inches higher than the bed on the south and 12 inches higher on the north, causing the slope to face to the south. The first two weeks in June, for night protection, when the sun disappears behind our high northern peaks for an hour or two, I covered the bed with windows just before I went to bed and removed them the first thing in the morning. The result was much better than I expected, with cucumbers 6 and 7 inches in length. The variety planted was the Early White Spine. Do you know any account of cucumbers being raised in open garden 60 miles north of the Arctic Circle before? [I do not.—Ed.] In the cucumber bed I transplanted a tomato plant, which throughout the season maintained a healthy growth, attaining 18 inches in height, and blossomed profusely, but the plant bore no tomatoes. When the blossoms had filled they seemed to disappear very quickly, so quick that I was led to believe that birds or some insect was the cause. The birds, a little brown sparrow, are great depredators of young plants, especially lettuce, radishes, turnips, and such. A bird will pull as many plants as it can possibly jam into its mouth, then fly away to its nest. The young sparrows later inherit the same desire for something green and tender, and as soon as they can fly they begin their thieving. The most potent remedy I could find was to keep a loaded shotgun leaning against the fence. We had a fine bed of rhubarb in a board inclosure. It is the first year's growth from seed. The plants were started from seed in boxes in the house, and transplanted about June 10. After transplanting I covered the box inclosure with gunny sacking at night, which I believe helped very materially in the rapid growth of the plants. The turnips grown are Orange Jelly or Robertson Golden Ball, Yellow Aberdeen, and Yellow or Amber Globe, the seeds coming from Portland, Oreg.; also White Milan turnip, a specimen weighing 9 pounds 11 ounces. White Milans, Purple-tops, and White Globes are always an assured crop with proper care. I raised three crops of Long White Vienna radishes in one bed, seed from Portland, Oreg. The three crops produced exceedingly healthy roots, long, tender, and delicious. The long white radishes surpassed the growth of all red radishes, although Wood Early Frame, Long Scarlet, and all turnip-shaped radishes did well. The white radishes were not attacked by "worms," like some of the red ones. Early Summer cabbage and Early Jersey Wakefield were grown. The Early Jersey Wakefield produced the best results generally, the largest weighing 8 pounds. The best Early Summer weighed nearly 8 pounds. I will try more varieties the coming season. Cauliflower and broccoli also grew fairly well. I planted four varieties of lettuce—Denver Market, Early Prize Head, Early Tennis Ball, and Simpson Early Curled. Each variety headed; the first two mentioned gave the best results, and our restaurant man said that he had never before seen finer heads,

so large, tender, and crisp. I raised a bed of corn salad and dug corn salad out of 6 inches of snow, green and fresh. I raised three crates of beets, Early Egyptian and Early Blood turnip. Both of good quality, averaged good size, some being quite large and but few were inclined to be woody. I also raised one crate of carrots, Early Scarlet Horn and Chantenays. As an experiment in potatoes I used butter cans with the bottoms cut out and set 12 cans in a box with half a potato in each, starting the vines in the house. June 10, when vines were 2 inches high, I transplanted them, lifting the cans from the ground. The vines blossomed and produced seed balls as large as marbles, and I had new potatoes nearly three weeks earlier than from my crop planted in open garden—a miracle in this country to have new potatoes that early in the season. My potato crop generally was a success, for this country at least. The best result was from seed potatoes home-grown, two years, of which I have heretofore made mention. The whole crop blossomed. I sold several crates of potatoes at 25 cents per pound and have enough left for table use all winter and seed in spring.

METEOROLOGICAL WORK.

Condensed reports from thirty-seven stations are submitted herewith. The writer regards this work of the utmost importance to the development of agriculture in Alaska. Aside from the agricultural experiment stations and from the military telegraph stations, the observers are all private individuals, who have kindly volunteered to cooperate with the Department in securing these data. These persons are conferring a benefit on Alaska, and their labors are much appreciated. The Chief of the Weather Bureau has kindly furnished the instruments, which consist of a rain gage and a maximum and a minimum thermometer for each station. These instruments are either forwarded to the cooperative observers from the Weather Bureau direct or a supply is sent to the special agent in charge, who then equips the observers and establishes new stations when expedient. The value of the record depends upon two things—(1) the care and accuracy with which they are recorded and (2) the continuity of the reports. A large majority of the observers who volunteer to keep records of the weather take a vital interest in the work, and furnish excellent, reliable reports month after month and year after year. The condensed data of these reports which are submitted herewith should be studied carefully by those who want information on the Alaska climate.

Condensed meteorological reports.

SITKA: Lat. 57° 3', Long. 135° 20'. R. W. De Armond, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	Inches.				
December	45	9	32.00	6.56	4	9	18	16
1907.								
January	44	7	27.28	2.36	19	5	7	6
February	49	9	34.03	3.55	8	4	16	12
March	48	9	32.32	1.75	13	2	16	8
April	62	28	40.54	1.80	10	14	6	6
May	72	35	52.35	3.84	15	3	13	10
June	63	45	49.81	3.66	7	5	18	22
July	75	44	54.40	4.66	10	5	16	17
August	77	43	54.47	12.60	3	6	22	20
September	67	37	54.16	15.75	14	2	14	13
October [a]	62	27	46.95	11.77		7	24	28
November	60	30	41.08	12.13	2	2	26	26

KENAI: Lat. 60° 32', Long. 151° 19'. Jas. W. Gray, observer.

1906.								
November	46	−16	22.59	0.39	15	3	12	6
December	36	−26	10.51	1.16	15	2	14	6
1907.								
January	34	−29	7.74	.68	19	2	10	6
February	38	−38	3.73	.61	16	1	11	6
March	40	−28	14.44	.67	16	5	10	5
April	53	5	36.31	.04	10	8	12	2
May	72	23	44.74	1.24	14	4	13	9
June	64	28	48.51	2.31	8	3	19	16
July	69	31	48.25	5.49	7	6	18	23
August	70	31	51.75	3.35	9	4	18	16
September	74	20	47.94	10.00	10	7	13	14
October	55	− 1	31.14	4.04	4	1	26	12
November	40	−12	22.26	2.15	12	2	16	7

COPPER CENTER: Lat. 62°, Long. 145°. C. W. H. Heideman, observer.

1906.								
October	58	9	30.93	0.74	5	10	16	7
November	44	−21	8.76	.99	11	9	10	6
December	40	−46	−16.27	.35	10	2	19	2
1907.								
January	39	−50	−14.03	.60	26	2	3	2
February	40	−48	−10.08	.60	21	7		4
March	33	−38	5.05	.40	19	1	11	3
April	52	−26	25.78		14	6	10	
May	70	20	43.66	.36	16	3	12	3
June	80	30	49.09	1.14	15	2	13	6
July	75	31	50.51	.97	13	1	17	7
August	65	25	47.93	.71	14	1	16	6
September	60	13	39.79	.25	16		14	2
October	52	−18	26.96	1.35	9		22	6
November	49	−26	4.00	.80	8		22	2

[a] No minimum record on October 13 and 14, 1907.

Condensed meteorological reports—Continued.

RAMPART: Lat. 65° 30′, Long. 150° 15′. F. E. Rader, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	Inches.				
September	67	17	42.89	0.59	9	12	9	4
October	54	− 2	26.04	.61	1	4	26	5
November	27	−50	− 4.73	.95	8	5	17	5
December	20	−48	−22.93	.33	17	2	12	5
1907.								
January	38	−59	− 6.64	1.17	6	5	20	8
February	17	−57	−23.46	.44	15	2	11	4
March	38	−42	3.58	1.17	9	3	19	6
April	63	−13	28.01	.02	20	7	3	1
May	79	19	46.77	.44	4	16	11	3
June	83	34	57.21	1.64	9	13	8	9
July	85	35	58.16	2.29	-------	11	20	20
August	84	31	55.62	3.38	13	13	5	18
September	67	20	39.08	2.52	7	5	18	15
October	35	−28	13.45	.65	9	4	18	8
November	27	−39	− 4.25	.55	9	8	13	7

FORTMAN SALMON HATCHERY, LORING: Lat. 55° 20′, Long. 131° 40′. Fred Patching, observer.

1906.								
November	47	25	36.81	21.57	3	6	21	24
December	44	8	27.06	7.96	5	6	20	17
1907.								
January	34	−14	12.96	.53	23	1	7	10
February	41	−10	26.17	13.03	4	1	23	20
March	43	0	29.45	4.98	9	9	13	20
April	63	24	38.63	7.76	8	10	12	21
May	74	28	50.33	4.30	10	13	8	13
June	82	36	53.86	5.23	6	12	12	18
July	85	44	59.36	3.73	10	10	11	15
August	77	39	56.14	9.75	2	16	13	23
September	72	30	53.16	10.14	6	12	12	20
October	63	30	46.25	20.09	-------	13	18	31
November	51	29	38.28	24.55	4	11	15	27

JUNEAU: Lat. 58° 20′, Long. 134° 30′. I. J. Sharick, observer.

1906.								
November	54	28	41.05	1.22	9	-------	21	18
December	55	2	30.56	5.50	18	-------	13	12
1907.								
January	43	1	21.11	4.40	24	-------	7	8
February	45	8	26.53	8.88	14	-------	14	17
March	49	6	28.99	2.92	7	21	3	13
April	63	22	41.96	3.01	23	-------	7	12
May	72	34	51.99	4.31	23	-------	8	13
June	74	38	54.72	2.55	18	-------	12	18
July	73	45	57.95	4.39	16	7	8	15
August	79	41	55.78	9.60	13	10	8	18
September	67	34	51.21	12.81	20	-------	10	16
October	50	24	42.75	10.57	11	-------	20	28
November	51	30	39.21	4.58	5	-------	25	25

Condensed meteorological reports—Continued.

SKAGWAY: Lat. 59° 5', Long. 135°. H. D. Clark, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
	°F.	°F.	°F.	Inches.				
1906.								
November	46	20	32.21	6.47	8	9	13	9
December	39	− 4	17.75	.33	10	7	14	4
1907.								
January	40	− 5	14.82	.46	16	12	3	5
February	42	− 3	17.56	4.85	8	7	13	8
March	42	2	24.09	.47	11	14	6	3
April	62	21	40.21	1.08	9	13	8	5
May	77	30	52.22	.92	11	15	5	5
June	73	41	55.81	.39	3	26	1	4
July	85	45	59.46	.01	7	11	13	6
August	76	43	57.54	1.97	6	13	12	10
September	67	30	50.56	2.49	7	15	8	5
October	56	20	41.12	4.87	-------	19	11	19
November	53	24	35.24	4.23	6	6	18	10

KILLISNO: Lat. 57° 30', Long. 134° 30'. Joseph Zuboff, observer.

1906.								
December	43	6	26.64	2.50	8	3	20	11
1907.								
January	36	5	19.48	1.40	21	3	7	4
February	45	5	26.41	9.55	7	2	19	17
March	50	8	29.55	1.70	9	11	11	9
April	57	28	40.53	1.35	9	7	14	11
May	65	31	47.14	1.60	9	10	12	7
June	67	40	51.19	3.85	6	10	14	12
July	68	42	54.19	3.05	7	10	14	12
August	70	40	53.88	4.65	2	12	16	24
September	61	32	48.36	6.85	5	12	13	11
October	57	27	43.56	8.05	-------	5	26	29

KATALLA: Lat. 60° 11', Long. 144° 34'. R. W. Moss, observer.

1907.								
April	51	22	36.91	7.50	8	10	12	11
May	68	31	45.64	4.85	12	4	15	17
June	79	41	49.59	8.29	7	7	16	20
July	78	43	55.26	13.96	3	3	25	23
August	78	36	53.96	11.41	6	9	16	23
September	74	36	50.88	12.34	11	5	14	19
October	54	22	40.89	25.62	2	4	25	29
November	54	20	35.34	12.44	4	4	22	24

ORCA: Lat. 60° 35', Long. 145° 41'. W. J. Shepard, observer.

1906.								
November	46	21	34.65	17.08	14	1	15	14
December	47	12	26.38	9.16	19	2	10	8
1907.								
January	38	10	25.75	3.26	23	3	5	4
February	40	5	22.24	8.53	14	1	13	12
March	45	4	25.23	3.95	22	8	1	7
October [a]	47	18	-------	21.82	2	6	23	27
November [b]	-------	18	-------	13.25	4	11	15	16

[a] Four days only in October, 1907. [b] No maximum record in November, 1907.

Condensed meteorological reports—Continued.

FORT LISCUM: Lat. 61° 27′, Long. 146° 27′. Lieut. L. H. Hanson, surgeon, U. S. Army, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	*Inches.*				
October	52	27	39.72	8.51	12	3	16	15
November	46	8	29.18	7.50	15	-------	15	11
December	40	3	20.88	6.75	16	3	12	7
1907.								
January	44	2	20.83	.90	9	2	20	2
February	36	− 9	15.80	10.14	7	6	15	11
March	38	3	20.70	6.04	10	11	10	8
April	53	11	34.53	.82	15	4	11	5
May	70	25	44.57	4.05	13	7	11	18
June	68	35	48.80	2.83	4	22	4	23
July	70	36	51.45	11.25	-------	4	27	27
August	66	31	49.62	10.61	3	4	24	25
September	66	27	44.81	11.98	7	3	20	19
October	50	10	35.53	16.77	4	3	24	25
November	47	11	29.24	7.94	2	6	22	17

WOOD ISLAND: Lat. 57° 47′, Long. 152° 20′. S. A. Coldwell, observer.

1906.								
November	48	20	35.98	5.10	9	-------	21	11
December	44	14	29.04	3.20	6	-------	25	9
1907.								
January	45	22	35.70	1.00	16	-------	15	3
February	42	− 3	26.04	4.00	13	-------	15	7
March	50	9	32.24	.00	22	-------	9	-------
April	58	9	37.71	6.10	3	-------	27	8
May	67	31	45.54	6.30	6	-------	25	12
June	71	35	49.16	5.20	11	-------	19	10
July	71	43	54.72	3.50	12	-------	19	8
August	65	41	54.02	3.70	10	-------	21	7
September	71	35	51.73	9.00	15	-------	15	10
October	56	16	40.73	8.70	9	-------	22	15
November	47	13	32.36	7.70	10	-------	20	15

SUNRISE: Lat. 60° 54′, Long. 149° 35′. A. Lawson, observer.

1906.								
November	42	3	24.26	3.87	6	6	18	6
December	38	−15	10.14	2.30	13	4	14	10
1907.								
January	36	−13	10.03	2.05	14	9	8	6
February	40	−24	10.17	1.93	10	7	11	11
March [a]	36	2	23.70	.33	1	-------	4	3
April	55	10	35.28	1.41	10	7	13	11
May	68	25	45.35	1.30	11	8	12	14
June	75	34	49.58	.74	6	9	15	15
July	72	39	52.72	4.62	4	8	19	22
August	68	35	51.22	2.29	4	8	19	17
September	67	26	47.28	4.45	6	5	19	14
October	55	6	34.18	6.03	3	6	22	24
November	51	− 3	24.51	7.32	9	1	20	18

[a] Five days only in March, 1907.

Condensed meteorological reports—Continued.

TYONOK: Lat. 61° 10′, Long. 151° 40′. E. Fay Woolsey, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	*Inches.*				
November	46	1	26.08	1.04	12	7	11	6
December	35	12	12.59	1.38	15	7	9	3
1907.								
January	35	−17	9.49	1.96	21	3	7	3
February	37	−25	10.71	1.08	17	-------	11	6
March	44	− 8	19.58	1.66	21	-------	10	5
April	56	14	36.35	.24	16	-------	14	3
June	68	33	50.80	2.86	9	3	18	13
July	69	41	54.25	6.39	11	3	17	20
August	73	37	55.40	3.05	12	5	14	15
September	66	31	48.36	5.76	4	12	14	16
October	57	5	34.82	3.48	11	6	14	16

COAL HARBOR: Lat. 55° 24′, Long. 160° 49′. Henry S. Tibbey, observer.

1906.								
November	49	20	34.80	4.24	6	10	14	11
December	46	12	28.50	2.75	11	8	11	12
1907.								
January	44	23	35.27	6.00	7	9	15	13
February	41	− 3	21.39	2.07	14	8	6	5
March	55	1	32.41	1.43	6	12	13	9
April	46	14	33.08	7.99	6	10	14	13
May	55	25	40.85	3.50	5	12	14	13
June	70	34	47.37	1.88	6	11	13	13
July	70	37	51.89	4.71	4	11	16	14
August	64	36	49.65	4.90	2	14	15	17
September	73	35	49.41	5.84	5	13	12	16
October	52	23	38.93	5.83	6	17	8	17

DUTCH HARBOR: Lat. 53° 54′, Long. 166° 32′. F. Schroeder, observer.

1906.								
October	53	29	42.03	7.91	-------	5	26	17
November	47	20	35.28	5.38	-------	1	29	14
December	52	23	39.08	5.76	-------	-------	31	11
1907.								
January	47	25	37.67	8.76	1	1	29	12
February	45	13	26.24	2.49	-------	1	27	4
March	57	20	37.20	2.93	-------	4	27	4
April	47	16	33.15	2.97	-------	1	29	5
May	48	26	39.45	5.39	-------	6	25	9
June	67	34	46.60	1.27	-------	8	22	3
July [a]	66	-------	-------	2.11	1	4	26	7
August [a]	62	-------	-------	3.25	2	13	16	18
October [b]	51	28	39.80	7.79	1	5	25	22

WORTMANS: Lat. 61° 30′, Long. 146°. Allen Coughnour, observer.

1906.								
June [c]	92	30	56.51	-------	6	-------	8	3
July	97	31	57.66	-------	7	3	21	8
August	92	28	55.64	-------	15	1	15	7
September	87	20	52.91	-------	17	3	10	3
October [d]	63	12	39.70	-------	13	5	13	1
November	51	− 5	23.45	-------	17	-------	13	10
December	37	−17	6.22	-------	19	7	5	7
1907.								
January [e]	34	−11	13.77	2.10	16	2	13	7

[a] Minimum thermometer broken; no record.
[b] Twenty days only in October, 1907.
[c] Fourteen days only in June, 1906.
[d] Thirty days only in October, 1906.
[e] Nine days only in January, 1907.

Condensed meteorological reports—Continued.

TEIKHEL: Lat. 61° 40′, Long. 145°. Jas. H. Anderson, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	Inches.				
July	80	28	52.15	2.70	3	1	27	14
August	76	27	50.98	.72	10	-------	21	7
September	66	17	42.11	.62	8	6	16	7
October	52	11	32.22	2.90	8	1	22	11
November	40	−13	12.39	3.52	12	2	16	16
December	38	−31	− 6.59	.36	16	4	11	8
1907.								
January	35	−32	− 3.67	.36	21	2	8	5
February	37	−36	− 1.25	1.83	15	2	11	9
March	42	−28	7.85	.56	16	5	10	8
April	58	−18	28.63	-------	14	-------	16	-------
May	76	21	47.08	.80	18	1	12	4
June	84	30	53.53	.68	10	8	12	6
July	100	32	59.77	8.20	7	5	19	8
August	103	49	55.59	2.00	7	7	17	7
September	75	19	47.09	1.20	12	3	15	4
October [a]	60	18	38.44	.66	1	-------	8	3

TONSINA: Lat. 61° 50′, Long. 145°. Otto Eckel, observer.

1907.								
July	87	38	57.54	0.14	6	1	24	2
August	73	28	53.38	.53	13	-------	18	7
September	66	16	45.36	.43	16	5	9	5
October	60	−22	29.81	1.07	8	1	22	5
November	47	−24	7.82	.80	12	2	16	3

KENNICOTT: Lat. 61° 30′, Long. 143°. J. E. Williams, observer. Altitude 6,000 feet.

1906.								
March [b]	63	12	30.19	-------	17	2	12	8
April	64	12	37.03	-------	13	6	11	6
May [c]	71	27	44.32	-------	16	4	7	5
June	74	34	50.38	-------	10	6	14	13
September [d]	59	35	41.55	-------	13	3	12	3
October	56	14	33.64	-------	8	-------	23	7
November	43	−10	16.33	-------	10	5	15	8

CHESTOCHINA: Lat. 62° 30′, Long. 145°. William F. Moderhak, observer.

1906.								
July	79	33	54.80	1.78	10	11	10	4
August	71	32	51.20	1.48	14	11	6	6
September [e]	68	22	44.20	.38	17	2	7	2
October [f]	52	6	28.60	.10	5	2	16	1
November	40	−14	11.20	.50	10	5	15	3
December	31	−35	− 9.22	1.80	14	2	15	4
1907.								
January [g]	15	−30	−13.18	-------	10	5	1	0
February	41	−55	− 9.73	.20	11	9	8	1
March	36	−39	− 4.30	.80	11	8	12	4
April	70	−16	31.64	.10	23	5	2	1
May	83	21	50.21	-------	16	6	9	-------
June	88	29	54.56	1.50	14	9	7	2
July	93	30	57.69	2.82	7	7	17	7
August	87	28	54.04	2.21	12	-------	19	6
September	75	23	48.99	2.07	9	1	20	9
October	62	−18	28.14	1.34	11	1	19	5

[a] Nine days only in October, 1907.
[b] No rain gage.
[c] Twenty-seven days only in May, 1906.
[d] Twenty-eight days only in September, 1906.
[e] Twenty-six days only in September, 1906.
[f] Twenty-three days only in October, 1906.
[g] Sixteen days only in January, 1907.

Condensed meteorological reports—Continued.

KETCHEMSTOCK: Lat. 64° 15′, Long. 142° 20′. Michael Doran, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	*Inches.*				
July	83	30	53.64	3.25	5	8	18	12
August	76	25	48.64	2.51	13	5	13	17
September	62	4	37.56	.51	13	9	8	7
October	50	0	25.96	.52	8	3	20	6
November	22	−37	− 3.12	.29	11	5	14	5
December	13	−54	−23.33	.20	15	2	14	3
1907.								
January [a]	33	−54	−15.98	.12	12	4	15	2
February [b]	25	−54	−24.92	.20	12	8	8	3
March	33	−53	− 5.22	.27	10	10	11	3
April	59	−40	28.73		14	10	6	
May	76	20	45.10	1.30	10	14	7	5
June	80	27	51.74	2.03	3	15	12	18
July								
August [c]	75	23	51.59	2.14	10	8	13	9
September [d]		12		.49	11	1	18	4
October [d]		−24		.72	11		20	4

CENTRAL: Lat. 64° 33′, Long. 145° E. C. Wheeler, observer.

1906.								
August [d]		30		1.85	13	16	2	14
September [d]		9		.52	13	13	4	6
October [d]		− 4		.75	6	10	15	7
November [d]		−42		.40	8	15	7	1
December [d]		−46		.35	18	5	8	3
1907.								
January [d e]		−56		1.04	10	5	10	7
February [d]		−56		.42	11	8	9	3
March [d]		−49		2.57	7	5	19	8
April [d]		−30		.93	20	4	6	2
May [d]		21		.57	6	13	12	7
June [d]		31		2.21	5	17	8	13
July [d]		30		1.40	10	13	8	14

NORTH FORK: Lat. 64° 30′, Long. 142° 10′. William F. Peyton, observer.

1906.								
July	82	37	56.33	2.69	11	7	13	8
August	72	36	56.70	1.01	8	19	4	4
September	62	7	40.21	.72	19	4	7	3
October	52	4	28.99	.42	1	9	21	7
November	33	−47	− .35	.38	6	7	17	4
December	8	−54	−22.09	.38	13	2	16	7
1907.								
January [f]	36	−55		.69	15	2	14	8
February [g]	19	−55		.23	20	1	7	4
March	28	−52	− 6.50	.27	8	12	11	3
April	62	−44	24.21		21	4	5	
May	78	22	45.04	1.07	9	6	16	8
June	78	30	52.15	1.92	8	11	11	17
July	84	29	54.41	1.57	10	12	9	10
August	74	26	50.15	3.19	8	14	9	16
September	60	13	38.00	2.00	8	14	8	13

[a] On 3 days temperature went below scale on thermometer.
[b] On 5 days temperature went below scale on thermometer.
[c] Twenty-one days only in August, 1907.
[d] Maximum thermometer broken; no record.
[e] Twenty-five days only in January, 1907.
[f] On 8 days temperature went below scale on thermometer.
[g] On 12 days temperature went below scale on thermometer.

Condensed meteorological reports—Continued.

FORT EGBERT: Lat. 64° 49′, Long. 141° 12′. John A. Gustafson, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	Inches.				
November	38	−50	− 0.53	0.57	9	4	17	3
December	34	−55	−16.56	.07	20	3	8	1
1907.								
January	36	−52	− 8.29	1.45	25	1	6	3
February	20	−54	−18.54	.20	26		2	2
March	37	−42	− .67	.00	4	23	4	
April	64	− 5	33.36	.15	21	1	8	1
May	82	21	49.87	.60	17	5	9	4
June [a]	80	34	57.26	1.89	14	7	9	12
July [b]		31		1.48	10	3	18	4
August [b]		27		1.98	11		20	13
September [b]		19		1.45	9	1	20	8
October [b]		−15		1.12	3		28	5

FORT EGBERT: Lat. 64° 49′, Long. 141° 12′. Lieut. Ferdinand Schmitter, surgeon, U. S. Army, observer.

1906.								
July	78	39	57.96					
August	72	28	47.46					
September	74	5	45.78					
October	75	10	30.83					
November	40	−48	.76					
December	24	−51	−15.59	0.07	20	3	8	1
1907.								
January	36	−52	− 9.98	1.45	24	1	6	3
February	20	−54	−18.54	.20	25	1	2	2

CIRCLE CITY: Lat. 65° 41′, Long. 144°. George H. Mills, jr., observer.

1906.								
December [c]	20	−49	−21.86	0.75	14	10	6	8
1907.								
January [d]	36	−50	−12.39	1.02	17	4	9	4
February	20	−51	−25.74	.57	17	4	7	3
March	35	−45	.74	.28	18	7	6	2
April	64	−32	23.91	.15	23	1	6	1
May	75	19	44.99	.29	20	1	9	6
June [e]	86	42	63.93	.50	6		2	1
July [f]	96	40	60.01	1.36	22		7	15
August [g]	85	29	55.88	2.59	14	2	14	12
September [h]	68	19	40.99	1.68	7	5	15	8
October [i]	37	1	22.69	.96		2	11	5
November [j]	34	−44	− 9.68	5.50	8	11	7	3

ALLAKAKET: Lat. 66° 45′, Long. 151° 10′. Clara M. Carter, observer.

1907.								
July [k]	75	39	56.62	1.38		7	1	6
August	75	26	52.83	2.49	4	20	7	17
September	55	12	37.94	1.45	2	18	10	14
October	37	−41	10.44	.70	13	10	8	7
November	31	−47	−13.63	.63	11	8	11	10

[a] Twenty-six days only in June, 1907.
[b] Maximum thermometer broken.
[c] Thirty days only in December, 1906.
[d] Thirty days only in January, 1907.
[e] Eight days only in June, 1907.
[f] Twenty-nine days only in July, 1907.
[g] Thirty days only in August, 1907.
[h] Twenty-seven days only in September, 1907.
[i] Thirteen days only in October, 1907.
[j] Twenty-six days only in November, 1907.
[k] Eight days only in July, 1907.

Condensed meteorological reports—Continued.

FAIRBANKS: Lat. 64° 50′, Long. 148° 9′. Isabel M. Emberly, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	Inches.				
October	58	2	31.16	0.30	11	7	13	8
November	37	−50	− .06	.65	9	9	12	4
December	30	−46	−16.67	1.15	17	1	13	9
1907.								
January	34	−58	− 4.03	3.30	13	2	16	15
March	35	−49	5.25	2.42	15	11	5	11
April	64	−31	30.19	.30	22	3	5	1
May	80	30	49.72	.35	14	8	9	4
June	79	37	57.11	1.47	15	13	2	12
July	82	38	59.65	1.51	13	15	3	14
August	84	36	55.39	1.81	9	21	1	11
September	63	20	42.58	3.58	12	10	8	16
October	42	−16	18.95	2.46	8	8	15	12
November	38	−41	− 1.92	.35	11	6	12	4

FAIRBANKS: Lat. 64° 50′, Long. 148° 9′. Edward E. Merrill, observer.

1907.								
June [a]	86	41	59.91	-------	7	5	19	-------
August	84	35	55.93	-------	12	-------	19	-------
September	65	19	43.63	-------	9	6	15	-------
October [b]	45	−13	-------	1.73	5	-------	26	10

FORT GIBBON: Lat. 65° 10′, Long. 152°. Charles B. Murphy, observer.

1906.								
October [c]	38	4	22.51	0.05	12	3	10	2
1907.								
August	90	33	56.37	2.31	5	13	13	11
September [d]	-------	20	-------	2.32	7	14	9	9

HOLY CROSS MISSION: Lat. 63° 28′, Long. 160°. Brother Constantine, observer.

1906.								
September	60	25	44.78	2.49	14	9	7	11
October	44	10	30.06	.11	15	5	11	2
November	35	−34	3.11	.90	21	1	8	2
December	34	−36	− 8.28	1.02	17	6	8	4
1907.								
January	36	−19	9.69	2.00	13	8	10	10
February	34	−40	−10.49	.55	17	4	7	4
March	37	−24	10.62	4.49	12	1	18	13
April	51	−14	25.64	-------	15	1	14	-------
May	76	20	42.62	-------	10	10	11	-------
June	74	36	52.35	2.95	10	9	11	13
July	68	35	53.67	3.71	5	14	12	24
August	72	33	51.74	5.39	2	7	22	22
September	61	27	43.50	3.56	10	6	14	8
October	43	−10	21.69	.38	20	3	8	3

ST. MICHAEL: Lat. 63° 28′, Long. 161° 48′. Leon E. Harper, observer.

1907.								
June	61	35	48.09	0.02	5	13	12	2
August [a]	68	32	51.18	-------	9	9	13	-------
September [a]	52	33	41.05	-------	8	7	15	-------

[a] No rain gage.
[b] Six days in October, 1907, only; maximum thermometer broken.
[c] Twenty-five days in October, 1906, only.
[d] Maximum thermometer broken.

Condensed meteorological reports—Continued.

NOME: Lat. 64° 30′, Long. 165° 24′. A. A. Gibson, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	*Inches.*				
July				2.38	16	6	9	8
September				1.02	19		11	8
October				.93	8		23	5
November				.32	22		8	2
December	29	−15	6.50	1.91	16	4	11	6
1907.								
January	33	−24	11.94	2.64	10	4	17	8
February	31	−31	−7.55	1.46	19	2	7	5
March	33	−32	5.58	3.37	11	2	18	8
April	41	−14	18.98	.10	18	2	10	2
May	49	15	34.28	1.12	10	5	16	10
June	65	30	45.53	1.31	12	5	13	10
July	66	34	50.04	2.08	10	4	17	16
August	69	30	49.80	2.68	8	9	14	17
September	52	29	41.06	1.41	13	6	11	13
October	44	3	24.49	.16	15	3	13	4
November	39	−12	9.48	.06	10	4	16	4

COUNCIL: Lat. 64° 53′, Long. 163°. G. A. Adams, observer.

1906.								
October [a]	58	1	31.46					
November	40	−24	8.78					
December [b]	23	−26	−2.33					
1907.								
January	34	−29	9.03					
February	26	−43	−10.41					
March	47	−40	14.45					
April [c]	57	−14	20.04					
May [d]	73	8	37.13					
September	63	20	40.39					
October	46	−10	9.61					

BLACK POINT: Lat. 64° 51′, Long. 165° 15′. F. F. Miller, observer.

1907.								
June [e]				1.01	4		4	4
July				1.94	8	9	14	16
August				2.85	7	16	8	18
September				3.26	20	3	7	14

TAYLOR: Lat. 65° 42′, Long. 164° 48′. A. E. Edgtret, observer.

1907.								
July [f]				0.66	3	3	8	5
August				.96	11	7	13	13

SHELTON: Lat. 65° 13′, Long. 164° 48′. Lars Gunderson, observer.

1907.								
July [g]				0.71	9	3	8	7
August				1.33	11	3	17	17
September				.47	11	3	16	8

[a] Sixteen days only in October, 1906.
[b] Twenty-seven days only in December, 1906.
[c] Twenty-five days only in April, 1907.
[d] Thirty days only in May, 1907.
[e] Eight days only in June, 1907.
[f] Fourteen days only in July, 1907.
[g] Twenty days only in July, 1907.

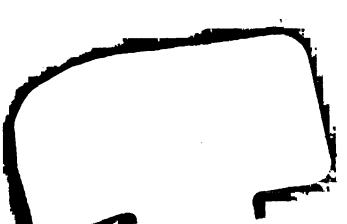
Condensed meteorological reports—Continued.

WALES: Lat. 65° 35′, Long. 168° 5′. A. N. Evans, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	Inches.				
September	53	27	40.20	0.66	8		22	7
October [a]	46	16	32.39	1.23	3	3	23	2
November [b]	38	− 8	16.01	.14	11		18	4
December [c]	20	−12	6.31		1	1	17	
1907.								
January [d]	39	−25	6.45	.68	21		8	5
February [e]	8	−38	−10.55	.64	21	7		2

DEERING: Lat. 66° 10′, Long. 162° 20′. Capt. J. E. Fox, observer.

1907.								
August [f]	82	24	51.01		9	4	18	3
September [f]	67	20	37.78		5	9	16	12

[a] Twenty-nine days only in October, 1906.
[b] Twenty-nine days only in November, 1906.
[c] Nineteen days only in December, 1906.
[d] Twenty-nine days only in January, 1907.
[e] Twenty-six days only in February, 1907.
[f] No rain gage.

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